A. Adda Henderson.

THE CHAUTAUQUAN

NOVEMBER, 1881.

A MONTHLY MAGAZINE DEVOTED TO THE PROMOTION OF TRUE CULTURE
ORGAN OF THE CHAUTAUQUA LITERARY AND SCIENTIFIC CIRCLE.

TABLE OF CONTENTS:

PAGE.

MOSAICS OF HISTORY. By Arthur Gilman, M. A. Part II. The Kingdom of Judea:—Golden Age of Prophecy--Four Periods of Subsequent History —First Period: Temple Rebuilt—Esther. Second Period: Under the Ptolemies—Under the Selucidæ. Third Period: Under the Maccabees—Under the Romans. Fourth Period: Under the Herods—Fall of Jerusalem. African Nations: Northern Africa—The Nile Valley. Five Nations: Egypt, Ethopia, Greek Settlements, Libyans, Carthage, Egypt. Three Periods: Early Civilization—Aggressive Wars—Pyramids Built —The Sphinx 67

GEOLOGY. By T. G. Bonney, M. A., F. G. S. Chapter III. Agents producing Changes—Forces at Work —Volcanoes—Earthquakes. Disturbed Strata. Texture of Igneous and Aqueous Rocks. Chapter IV. Destructive Agents in Nature. Chapter V. The Sea: Its effects in cutting cliffs, caves, etc. Currents and their courses. Chapter VI. Ice—Glaciers—Destructive effects of a Glacier—Icebergs. Chapter VII. Fossils, and the Modes in which they are Preserved. Chapter VIII. The Organically formed Rocks: Peat, Coal, Lignite, Flint, Limestone. Coral Reefs. Chapter IX. Palæontology. Principal Divisions of the Animal Kingdom. List, and Brief accounts of them. Stratified Rocks in the Order of Time 73

SHE WAS A PHANTOM. A Poem. By William Wordsworth 86

PARENTAL RECOLLECTIONS. A Poem. By Charles Lamb. 86

THE CHRISTIAN CITIZEN. By Hon. Albion W. Tourgee. Definition of Citizen—of Christian—Relation of Christianity to Political Duty—The Problem of Self-Government—How to beat the Bosses—No Pity for those who are ruled by Bosses—No Respect for Bosses—Politics in the South—Parties a necessity—Good men must rule the parties. 86

ELECTRICITY THE FORCE OF THE FUTURE. By John A. Bower 91

ODE TO DUTY. A Poem. By William Wordsworth . 94

MATTER AND VITALITY. By the Rev. H. H. Moore . 94

AH, SUNFLOWER. A Poem. By William Blake . . . 100

SOME WONDERS OF THE SEA. By the Rev. J. G. Wood, M. A. 100

NEIGHBORS. A POEM. 103

THE CATACOMBS OF ROME. By the Rev. Wm. H. Withrow, M. A. 103

A COMPARISON. A Poem. By William Cowper . . . 106

ARCHERY. By Goethe and Eckermann 106

ON A ROCK BOUND COAST. A Poem. By Sarah Doudney. 109

A SIMILE. A Poem. By Matthew Prior 109

C. L. S. C. ROUND-TABLE. Rev. J. H. Vincent, D. D., presiding. 109

HISTORY OF ART. By A. M. Martin, Esq. One Hundred Questions and Answers on the History of Art—from the Renaissance to Art in the Nineteenth Century—both included. 114

C. L. S. C. NOTES AND LETTERS. By A. M. Martin, Esq 116

LOCAL CIRCLES. Memorial Days — Bryant's Day: "Thanatopsis," "A Forest Hymn", Planting of the Apple Tree. Special Sunday. Plan of Readings for November 117

C. L. S. C. ANNOUNCEMENT FOR 1881-82 122

EDITOR'S OUTLOOK. The New Version and the Christian Misistry--In Memoriam—American Reformers abroad—Dr. J. G. Holland—A Noble Deed . 123

EDITOR'S NOTE BOOK 125

EDITOR'S TABLE 126

THEODORE L. FLOOD, D. D., Editor.

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MOSAICS OF HISTORY.

II.

THE KINGDOM OF JUDEA.

GOLDEN AGE OF PROPHECY.—The national life of the Hebrews seemed now extinct; but there was still, as there had been all along, a spiritual life hidden within the body. It was a time of hopeless darkness to all but those Jews who had strong faith in God, with a clear and steady insight into the ways of Providence as interpreted by prophecy. The time of the division of the kingdoms was the golden age of prophecy. In each kingdom the prophetical office was subject to peculiar modifications which were required in Judah by the circumstances of the priesthood, in Israel by the existence of the house of Baal and the altar in Bethel. If, under the shadow of the temple, there was a depth and a grasp elsewhere unequaled, in the views of Isaiah and the prophets of Judah, if their writings touched and elevated the hearts of thinking men in studious retirement in the silent night-watches; there was also, in the few burning words and energetic deeds of the prophets of Israel, a power to tame a lawless multitude and to check the high-handed tyranny and idolatry of kings. The organization and moral influence of the priesthood were matured in the time of David; from about that time to the building of the second temple the influence of the prophets rose and became predominant.*

FOUR PERIODS IN THE SUBSEQUENT HISTORY.

This history naturally divides itself into two periods:—(1) From the captivity to the fall of the Persian empire, B. C. 586 to 323; and (2) From the fall of the Persian empire to the reëstablishment of an independent kingdom, B. C. 323 to 168. The history of the kingdom may also be most conveniently treated in two portions:—(1) The Maccabee period, from B. C. 168 to 37; and (2) The period of the Herods, B. C. 37 to A. D. 44, when Judea became finally a Roman province. Thus the entire history will fall under four heads.†

FIRST PERIOD.

About fifty years after the completion of the captivity by Nebuchadnezzar, and nearly seventy years after its commencement, a great change was effected in the condition of the Jewish people by Cyrus. That monarch having captured Babylon in the year B. C. 538, found among his new subjects an oppressed race, in whose religion he recognized a considerable resemblance to his own, and in whose fortunes he therefore took a special interest. Learning that they had been violently removed from their own country two generations previously, and finding that numbers of them had a strong desire to return, he gave permission that such as wished might go back and reëstablish themselves in their country. Accordingly, a colony, numbering 42,360 persons, besides their servants, set out from Babylonia, and made their way to Jerusalem; in or near which the greater number of them settled. This colony, at the head of which was Zerubbabel, a descendant of the old line of kings, was afterwards strengthened by two others, one led by Ezra, in B. C. 458, and the other by Nehemiah, in B. C. 445. Besides these known accessions, there was probably also for many years a continual influx of individuals, or families, who were attracted to their own land, not only by the love of country, which has always been so especially strong in the Jews, but also by motives of religion. Still great numbers of Jews, probably half a nation, remained where they had so long resided, in Babylonia and the adjoining countries.*

TEMPLE REBUILT.—The exiles who returned under Zerubbabel belonged predominantly, if not exclusively, to three tribes, Judah, Levi, and Benjamin. It was their first object to rebuild their famous temple on its former site and to reëstablish the old temple service. But in this work they were greatly hindered by their neighbors. A mixed race, partly Israelite, partly foreign—including Babylonians, Persians, Elamites, Arabs, and others—had repeopled the old kingdom of Samaria, and established there a mongrel worship, in part Jehovistic, in part idolatrous. On the first arrival of the Jewish colony, this mixed race proposed to join the new-comers in the erection of their temple, and to make it a common sanctuary, open both to themselves and the Jews. But such a course would have been dangerous to the purity of religion; and Zerubbabel very properly declined the offer. His refusal stirred up a spirit of hostility among the "Samaritans;" which showed itself in prolonged efforts to prevent the rebuilding of the temple and the city—efforts which were for a while successful, considerably delaying, though they could not finally defeat the work.*

ESTHER.—The favor of Darius Hystaspis allowed the Jews to complete their temple, and to establish themselves firmly in the country of their ancestors, despite the ill-will of the surrounding nations and tribes. But in the reign of his successor, Xerxes,† a terrible danger was incurred.

*Smith's Bible Dictionary.

†Rawlinson's "Ancient History."

* Rawlinson's "Ancient History."

† The "Ahasuerus" of the book of Esther has been identified by writers of repute with Darius Hystaspis and with Artaxerxes Longimanus, as well as with Xerxes. But the notes of time, character, and name, which all point to Xerxes, have produced among moderns almost a consensus in his favor. The historical character of the narrative is proved by the institution of the feast of Purim, which is still kept by the Jews, and of which n other account can be given.

That weak prince allowed his minister, Haman (Omanes?), to persuade him that it would be for the advantage of his empire if the Jews, who were to be found in various parts of his dominions, always a distinct race, not amalgamating with those among whom they lived, could be quietly got rid of. Having obtained the monarch's consent, he planned and prepared a general massacre, by which on one day the whole race was to be swept from the earth. Fortunately for the doomed nation, the inclination of the fickle king had shifted before the day of execution came, the interposition of the wife in favor at the time, who was a Jewess, having availed for the preservation of her people. Instead of being taken unawares by their enemies, and massacred unresistingly, the Jews were everywhere warned of their danger and allowed to stand on their defence. The weight of the government was thrown on their side; and the result was that, wherever they were attacked they triumphed, and improved their future position by the destruction of all their most bitter adversaries.*

DANGERS.—Though the Jews had thus escaped this great danger, and had strengthened their position by the destruction of so many of their enemies, yet their continued existence as a separate nation was still far from secure. Two causes imperilled it. In spite of the refusal to allow foreigners, even though partially allied in race, to take part in the rebuilding of the temple, a tendency showed itself, as time went on, toward a fusion with the surrounding peoples. The practice of intermarriage with these peoples commenced, and had gained a great head when Ezra brought his colony from Babylon in the seventh year of Longimanus, B. C. 458. By the earnest efforts, first of Ezra, and then of Nehemiah, about B. C. 434, this evil was checked.

The other peril was of a different kind. Jerusalem, though rebuilt on the old site by the colony of Zerubbabel, was without walls or other defences, and thus lay open to attack on the part of any hostile neighbor. The authority of Persia was weak in the more remote provinces, which not unfrequently revolted, and remained for years in a state bordering on anarchy. It was an important gain to the Jews when, in the twentieth year of Artaxerxes, Nehemiah came down from the court with authority to refortify the city, and effected his purpose, despite the opposition which he encountered, B. C. 445.*

METHOD OF THE PERSIAN RULE.—It was a feature of the Persian system to allow the nations under their rule a good deal of self-government and internal independence. Judea was a portion of the Syrian satrapy, and had no doubt to submit to such requisitions as the Syrian satrap made upon it for men and money. But, so long as these requisitions were complied with, there was not much further interference with the people, or with their mode of managing their own affairs. Occasionally a local governor (Tirshatha), with a rank and title below those of a satrap, was appointed by the crown to superintend Judea, or Jerusalem; but these officers do not appear to have succeeded each other with regularity, and, when they were appointed, it would seem that they were always natives. In default of a regular succession of such governors, the high priests came to be regarded as not merely the religious but also the political heads of the nation, and the general direction of affairs fell into their hands.*

SECOND PERIOD.

UNDER THE PTOLEMIES.—In the partitions which were made of Alexander's dominions at Babylon and at Triparadisus, the Syrian satrapy, which included Palestine, was constituted a separate government. But a very little time elapsed before Ptolemy Lagi annexed the satrapy, the southern division of which continued thenceforward, except during short intervals, a portion of the kingdom of Egypt, until the reign of Ptolemy Epiphanes. It is uncertain whether Alexander assigned the Jews any special privileges in the great city which he founded in Egypt; but there can be no doubt that the early Ptolemies highly favored this class of their subjects, attracting them in vast numbers to their capital, encouraging their literature, and granting them many privileges. The subjection of Judea to Egypt lasted from B. C. 320 to B. C. 203; and though the country was during this space ravaged more than once by the forces of contending armies, yet on the whole the time must be regarded as one of general peace and prosperity. The high priests continued to be at the head of the state, and ruled Judea without much oppressive interference from the Egyptians.*

UNDER THE SELUCIDÆ.—Toward the close of the Ptolemaic period, the Jews began to have serious cause of complaint against their Egyptian rulers. The fourth Ptolemy (Philopator), a weak and debauched prince, attempted to violate the sanctity of the Jewish temple by entering it, and, when his attempt was frustrated, sought to revenge himself by punishing the Alexandrian Jews, who had done him no injury at all. It was the natural result of these violent proceedings that the Jews, in disgust and alarm, should seek a protector elsewhere. Accordingly, when Antiochus the Great, in the infancy of Ptolemy Epiphanes, determined to attack Egypt, and to annex, if possible, to his own dominions the valuable maritime tract extending from his province of Upper Syria to the Sinaitic Desert, the Jews voluntarily joined him; and though Ptolemy's general, Scopas, recovered most of what had been lost, yet Antiochus, by the victory of Paneas, B. C. 198, was left in final possession of the whole region, which thenceforth, though often disputed by Egypt, became a possession of the Syrian kings.

Under Antiochus the Great, and for a time under his elder son, Seleucus Philopator, the Jews had no reason to repent the exchange they had made. Both Antiochus, and Seleucus for a while, respected the privileges of the nation, and abstained from any proceedings that could give umbrage to their new subjects. But toward the close of the reign of Seleucus an important change of policy took place. The wealth of the Jewish temple being reported to the Syrian monarch, and his own needs being great, he made an attempt to appropriate the sacred treasure, which was, however, frustrated, either by miracle, or by the contrivance of the high priest, Onias. This unwarrantable attempt of Seleucus was followed by worse outrages in the reign of his brother and successor, Antiochus Epiphanes. Not only did that monarch sell the office of high priest, first to Jason and then to Menelaus, but he endeavored to effect by systematic proceedings the complete Hellenization of the Jews, whereto a party in the nation was already sufficiently inclined. Further, having, by his own iniquitous proceedings in the matter of the high priesthood, given occasion to a civil war between the rival claimants, he chose to regard the war as rebellion against his authority, and on his return from his second Egyptian campaign, B. C. 170, took possession of Jerusalem, and gave it up to massacres and pillage. At the same time he plundered the temple of its sacred vessels and treasures. Nor was this all. Two years afterwards, B. C. 168, he caused Jerusalem to be occupied a second time by an armed force, set up an idol altar in the temple, and caused sacrifice to be offered there to Jupiter Olympus. The Jews were forbidden any longer to observe the law, and were to be Hellenized by main force. Hence the rising under the Maccabees, and the gradual reëstablishment of independence.*

* Rawlinson's "Ancient History."

* Rawlinson's "Ancient History."

THIRD PERIOD.—INDEPENDENCE.

UNDER THE MACCABEES.—At first the patriots who rose up against the attempt to annihilate the national religion and life were a scanty band, maintaining themselves with difficulty in the mountains against the forces of the Syrian kings. Jerusalem, which was won by Judas Maccabæus, was lost again at his death; and it was not till about B. C. 153, fourteen years after the first revolt, that the struggle entered on a new phase in consequence of the contentions which then began between different pretenders to the Syrian throne. When war arose between Demetrius and Alexander Balas, the support of the Jews was felt to be of importance by both parties. Both, consequently, made overtures to Jonathan, the third Maccabee prince, who was shortly recognized not only as prince but also as high priest of the nation. From this time, as there were almost constant disputes between rival claimants of the crown in Syria, the Jews were able to maintain themselves with comparative ease. Once or twice, during a pause in the Syrian contest, they were attacked and were forced to make a temporary submission. But the general result was that they maintained, and indeed continually enlarged, their independence. For some time they did not object to acknowledge the Syrian monarch as their suzerain, and to pay him an annual tribute; but after the death of Antiochus VII (Sidetes), all such payments seem to have ceased, and the complete independence of the country was established. Coins were struck bearing the name of the Maccabee prince, and the title of "King." Judea was indeed from this time as powerful a monarchy as Syria. John Hyrcanus conquered Samaria and Idumæa, and thus largely extended the Jewish boundaries, exactly at the time when those of Syria were undergoing rapid contraction.*

UNDER THE ROMANS.—The deliverance of the state from any further fear of subjection by Syria, was followed almost immediately by internal quarrels and dissensions, which led naturally to the acceptance of a position of subordination under another power. The Pharisees and Sadducees, hitherto mere religious sects, became transformed into political factions. Civil wars broke out. The members of the royal family quarreled among each other, and the different pretenders to the crown appealed for assistance to foreign nations. About B. C. 63 the Romans entered upon the scene; and for the last twenty-six years of the Maccabee period—B. C. 63 to 37—while feeble princes of the once mighty Asmonæan family still nominally held the throne, the great republic was really supreme in Palestine, took tribute, and appointed governors, or sanctioned the rule of kings, at her pleasure. It is the change of dynasty, and not any change in the internal condition of the country, that causes the year B. C. 37 to be taken as that at which to draw the line between the close of one period and the commencement of another.*

FOURTH PERIOD.

UNDER THE HERODS.—During the fourth period Roman influence was, not only practically, as during much of the third period, but professedly predominant over the country. The Herods, who owed their establishment in authority wholly to the Romans, had no other means of maintaining themselves than by preserving the favor of their patrons. Obnoxious, except to a small fraction of the nation, from their Idumæan descent, they were hated still more as the minions of a foreign power, a standing proof to the nation of its own weakness and degraded condition. On the other hand, there were no doubt some who viewed the rule of the Herods as, in a certain sense, a protection against Rome, a something interposed between the nation and its purely heathen oppressors, saving the national life from extinction, and offering the best compromise which circumstances permitted between an impossible entire independence and a too probable absorption into the empire. Such persons were willing to see in Herod the Great, and again in Herod Agrippa, the Messiah—the king foredoomed to save them from the yoke of the foreigner, and to obtain for them the respect, if not even the obedience, of the surrounding peoples.

But these feelings, and the attachment to the dynasty which grew out of them, must have become weaker as time went on. The kingdom of the Herods gradually lost instead of gaining in power. Rome continually encroached more and more. As early as A. D. 8, a portion of Palestine, and the most important portion in the eyes of the Jews, was formally incorporated into the Roman empire; and though the caprice of an emperor afterward revoked this proceeding, and restored another Herod to the throne of his grandfather, yet from the moment when the first procurator levied taxes in a Jewish province all but the wilfully blind must have seen what was impending. The civil authority of the last native prince over Judea came to an end in A. D. 44; and the whole of Palestine, except a small district held as a kingdom by Agrippa II, was from that time absorbed into the empire, being appended to the Roman province of Syria, and ruled wholly by Roman procurators. The national life was consequently at the last gasp. As far as political forms went, it was extinct; but there remained enough of vital energy in the seeming corpse for the nation once more to reassert itself, and to show by the great "war of independence" that it was not to be finally crushed without a fearful struggle, the issue of which at one time appeared almost doubtful.

The proximate cause of the great Jewish revolt, and of the "war of independence," was the oppression of the procurators, and especially of Gessius Florus. But, even had the Roman governors ruled mildly, it is probable that a rebellion would sooner or later have broken out. The Roman system was unlike those of the foreign powers to which Judea had in former times submitted. It was intolerant of differences, and aimed everywhere, not only at absorbing, but at assimilating the populations. The Jews could under no circumstances have allowed their nationality to be crushed otherwise than by violence. As it was, the tyranny of Gessius Florus precipitated a struggle which must have come in any case, and made the contest fiercer, bloodier, and more protracted than it might have been otherwise. From the first revolt against his authority to the capture of the city by Titus was a period of nearly five years, A. D. 66 to 70. The fall of the city was followed by its destruction, partly as a punishment for the desperation of the resistance, but more as a precaution to deprive the Jews, now felt to be really formidable, of their natural rallying point in any future rebellion.*

FALL OF JERUSALEM.—In the year 63 B. C. Jerusalem was captured by the Roman general Pompey, and Judea became a part of the Roman province of Syria. The temple was plundered by Crassus, 54 B. C., but he was vanquished the next year, and the Roman rule was intermitted until 37 B. C., when Herod the Great, a noble Idumæan, with the aid of the Romans, entered Jerusalem in triumph. His administration was vigorous and splendid, being for thirty years undisturbed by war, though it was marked by atrocious cruelties, among which was the slaughter of the innocents in the village of Bethlehem, recorded by St. Matthew. Herod's death occurred the year of our Saviour's birth, when he was succeeded by Archelaus, his son.

In the year 38 A. D., during the reign of Herod Agrippa, the Roman emperor Caligula issued an edict ordering divine

*Rawlinson's "Ancient History."

*Rawlinson's "Ancient History."

honors to be paid him. This was followed by terrible civil commotions, massacres, intestine wars, and finally, in the year 70 A. D., by the siege and destruction of Jerusalem by Titus. The details of this siege are too heartrending to be dwelt upon, resulting as it did in the loss of over a million and a quarter of lives, after a heroic but insane effort to resist the Romans.

The city was razed to the ground, many of its citizens perished in gladiatorial fights before the Romans and Greeks, and the nation became dispersed, as it now is, throughout every country of the world—wonderful alike in its superb prosperity, and in its overwhelming destruction!

"O'er Judah's land Thy thunders broke, O Lord!
The chariots rattled o'er her sunken gate,
And heaps her ivory palaces became;
Her princes wore the captive's garb of shame,
Her temples sank amid the smouldering flame."*

AFRICAN NATIONS.

CONTRAST BETWEEN AFRICA AND ASIA.—The continent of Africa offers a remarkable contrast to that of Asia in every important physical characteristic. Asia extends itself through all three zones, the torrid, the frigid and the temperate, and lies mainly in the last, or most favored of them. Africa belongs almost entirely to the torrid zone, extending only a little way north and south into those portions of the two temperate zones which lie nearest to the tropics. Asia has a coast deeply indented with numerous bays and gulfs; Africa has but one considerable indentation—the Gulf of Guinea, on its western side. Asia, again, is traversed by frequent and lofty mountain chains, the sources from which flow numerous rivers of first-rate magnitude. Africa has but two *great* rivers, the Nile and the Niger, and is deficient in mountains of high elevation. Finally, Asia possesses numerous littoral islands of a large size; Africa has but one such island, Madagascar; and even the islets which lie off its coast are, comparatively speaking, few.†

ARIDITY AND GENERAL INFERTILITY OF AFRICA.—Its equatorial position, its low elevation, and its want of important rivers render Africa the hottest, the driest, and the most infertile of the four continents. In the north a sea of sand, known as the Sahara, stretches from east to west across the entire continent from the Atlantic to the Red Sea, and occupies fully one-fifth of its surface. Smaller tracts of an almost equally arid character occur toward the south. Much of the interior consists of swampy jungle, impervious, and fatal to human life. The physical characteristics of the continent render it generally unapt for civilization or for the growth of great states. It is only in a few regions that nature wears a more benignant aspect, and offers conditions favorable to human progress. These regions are chiefly in the north and the northeast, in the near vicinity of the Mediterranean and the Red Sea.†

NORTHERN AFRICA.—It was only the more northern part of Africa that was known to the ancients, or that had any direct bearing on the history of the ancient world. Here the geographical features were very marked and striking. First, there lay close along the seashore a narrow strip of generally fertile territory, watered by streams which emptied themselves into the Mediterranean. South of this was a tract of rocky mountain, less fitted for human habitation, though in places producing abundance of dates. Thirdly, came the great desert, interspersed with oases—islands in the sea of sand containing springs of water and a flourishing vegetation. Below the Sahara, and completely separated by it from any political contact with the countries of the north, but crossed occasionally by caravans for purposes of commerce, was a second fertile region, a land of large rivers and lakes, where there were cities and a numerous population.

The western portion of North Africa stood, in some respects, in marked contrast with the eastern. Toward the east the fertile coast-tract is in general exceedingly narrow, and sparingly watered by a small number of insignificant streams. The range of bare, rocky hills from which they flow—the continuation of Atlas—is of low elevation; and the great desert often approaches within a very short distance of the coast. Toward the west the lofty range of Atlas, running at a considerable distance (200 miles) from the shore, allows a broad tract of fertile ground to intervene between its crest and the sea. The range itself is well wooded, and gives birth to many rivers of a fair size. Here states of importance may grow up, for the resources of the tract are great; the soil is good; the climate not insalubrious; but toward the east nature has been a niggard; and, from longitude 10° east nearly to longitude 30°, there is not a single position where even a second-rate state could long maintain itself.*

THE NILE VALLEY.—The description of North Africa, which has been here given, holds good as far as longitude 30°; but east of this line there commences another and very different region. From the highlands of Abyssinia and the great reservoirs on the line of the equator, the Nile rolls down its vast body of waters with a course whose general direction is from south to north, and, meeting the desert, flows across it in a mighty stream, which renders this corner of the continent the richest and most valuable of all the tracts contained in it. The Nile Valley is 3,000 miles long, and, in its upper portion, of unknown width. When it enters the desert, about latitude 16°, its width contracts; and from the sixth cataract down to Cairo, the average breadth of the cultivable soil does not exceed fifteen miles. This soil, however, is of the best possible quality; and the possession of the strip on either side of the river, and of the broader tract known as the Delta, about its mouth, naturally constitutes the power which holds it a great and important state. The proximity of this part of Africa to Western Asia and to Europe, its healthiness and comparatively temperate climate, likewise favored the development in this region of an early civilization, and the formation of a monarchy which played an important part in the history of the ancient world.

Above the point at which the Nile enters the desert, on the right or east bank of the stream, occurs another tract, physically very remarkable, and capable of becoming politically of high consideration. Here there is interposed between the main stream of the Nile and the Red Sea an elevated table-land, 8,000 feet above the ocean level, surrounded and intersected by mountains, which rise in places to the height of 15,000 feet. These lofty masses attract and condense the vapors that float in from the neighboring sea; and the country is thus subject to violent rains, which during the summer months fill the river courses, and, flowing down them to the Nile, are the cause of that stream's periodical overflow, and so of the rich fertility of Egypt. The abundance of moisture renders the plateau generally productive; and the region, which may be regarded as containing from 200,000 to 250,000 square miles, is thus one well capable of nourishing and sustaining a power of the first magnitude.*

FIVE NATIONS.—The nations inhabiting Northern Africa in the times anterior to Cyrus were, according to the belief

*Gilman's General History.
†Rawlinson's "Ancient History."

* Rawlinson's "Ancient History."

of the Greeks, five. These were the Egyptians, the Ethiopians, the Greeks, the Phœnicians, and the Libyans.

I. EGYPT.—To the Egyptians belonged the Nile valley from latitude 24° to the coast, together with the barren region between that valley and the Red Sea, and the fertile tract of the Faioom about Mœris, on the opposite side of the stream. Its most important portion was the delta, which contained about 8,000 square miles, and was studded with cities of note. The chief towns, were, however, in the narrow valley. These were Memphis, not much above the apex of the delta, and Thebes, about latitude 26°. Besides these, the places of importance were, in Upper Egypt, Elephantine and Chemmis, or Panopolis; in the lower country, Heliopolis, Sais, Sebennytus, Mendes, Tanis, Bubastis, and Pelusium. The Nile was the only Egyptian river; but at the distance of about ninety miles from the sea, the great stream divided itself into three distinct channels, known as the Canobic, the Sebennytic, and the Pelusiac branches; while, lower down, these channels further subdivided themselves, so that in the time of Herodotus the Nile waters reached the Mediterranean by seven distinct mouths. Egypt had one large and several smaller lakes. The large lake, know by the name of Mœris, lay on the west side of the Nile, in latitude 29° 50′. It was believed to be artificial, but was really a natural depression.

II. ETHIOPIA.—The Ethiopians held the valley of the Nile above Egypt, and the whole of the plateau from which descend the great Nile affluents, the modern country of Abyssinia. Their chief city was Meroë. Little was known of the tract by the ancients; but it was believed to be excessively rich in gold. A tribe called Troglodyte Ethiopians—*i. e.*, Ethiopians who burrowed under ground—is mentioned as inhabiting the Sahara where it adjoins upon Fezzan.

III. GREEK SETTLEMENTS.—The Greeks had colonized the portion of Northern Africa which approached most nearly to the Peloponnese, having settled at Cyrene about B. C. 630, and at Barca about seventy years afterwards. They had also a colony at Naucratis in Egypt, and perhaps a settlement at the greater oasis.

IV. LIBYANS.—The Libyans possessed the greater part of Northern Africa, extending, as they did, from the borders of Egypt to the Atlantic Ocean, and from the Mediterranean to the Great Desert. They were divided into a number of tribes, among which the following were the most remarkable: The Adyrmachidæ, who bordered on Egypt, the Nasamonians on the greater Syrtis, the Garamantes, in the modern Fezzan, and the Atlantes in the range of Atlas. Most of these races were nomadic; but some of the more western cultivated the soil and, consequently, had fixed abodes. Politically, all these tribes were excessively weak.

V. CARTHAGE.—The Carthaginians, or Liby-Phœnicians—immigrants into Africa, like the Greeks—had fixed themselves in the fertile region north of the Atlas chain, at the point where it approaches nearest to Sicily. Here in a cluster lay the important towns of Carthage, Utica, Hippozaritus, Tunis, and Zama Regia, while a little removed were Adrumetum, Leptis, and Hippo Regius. The entire tract was fertile and well watered, intersected by numerous ranges, spurs from the main chain of Atlas. Its principal river was the Bagrada (now Majerdah), which emptied itself into the sea a little to the northwest of Carthage. The entire coast was indented by numerous bays; and excellent land-locked harbors were formed by salt lakes connected with the sea by narrow channels. Such was the Hipponites Palus (L. Benzart) near Hippo Zaritus, and the great harbor of Carthage, now that of Tunis. Next to the Nile valley, this was the portion of Northern Africa most favored by nature, and best suited for the habitation of a great power.*

*Rawlinson's "Ancient History."

EGYPT.

Egypt holds a most important place in history, for, if it was not absolutely the oldest nation of the earth, it was the source of civilization, art and letters to all the world, and it is impossible to show from what other nation, if any, Egypt derived its mythological religion, its philosophy and science. Nearly all the arts and sciences of the present day originated in Egypt—architecture and sculpture, medicine, chemistry, mathematics, astronomy, writing, and the use of paper, and many of the mechanical arts as now practiced are only such as were known and employed in Egypt ages ago.

When Greek history begins, Egypt was on the verge of its decline. Even in the days of Abraham, the pyramids had been built and copper mines worked on Mount Sinai; and as, according to the Jewish tradition, he led his herds to drink in the Nile, he must have seen many of the monuments whose ruins now tell of the advanced state of Egyptian art at that time. Moses, we are told, was educated in all the learning of the Egyptians, and though we have no history of those times in books, their history was written in hieroglyphics, on temples and obelisks, long before the Greek alphabet was known.

Ancient Egypt was also the land of the greatest luxury. Even prior to the captivity of the Israelites, gold and silver ornaments, fine colors and embroideries were in common use, and at the time of the Exodus the luxury and magnificence of the wealthy almost equalled that of the great Cleopatra, the most luxurious queen the world has ever seen. Twelve centuries before the birth of Christ the Nile valley was filled with cities and palaces, vast temples and magnificent tombs; and there is scarcely an article of comfort or luxury now in use that has not its counterpart in some of the pictures, still fresh and bright, on the walls of the tombs of the ancient kings of Egypt.

"Hail! Egypt! land of ancient pomp and pride,
Where beauty walks by hoary ruin's side;
Where plenty reigns, and still the seasons smile,
And rolls—rich gift of God!—exhaustless Nile.
Land of the pyramid and temple lone!
Whose fame, a star, on earth's dark midnight shone;
Bright seat of wisdom, graced with arts and arms,
Ere Rome was built, or smiled fair Athens' charms;
What owes the past, the living world to thee?
All that refines, sublimes humanity.
The tall papyrus, whispering seems to say,
Here rose the letters Cadmus bore away.
The Greek to thee his Jove and Bacchus owes,
With many a tale that charms, and thought that glows.
In thy famed schools the Samian learnt his lore,
That souls, though wandering, lived for evermore;
The giant structures piled on Gizeh's plain
Speak of the sages watching heaven's bright train,
Who first years, months divided—traced afar
The comet's course, and named each glittering star.
. . . . . .
What though no more the priest on Isis calls,
Or grand processions sweep from Memphis's walls,
Praying the flood to rise o'er bower and field,
Still swell the waves, and wonted blessings yield;
And sweet the stream to traveler's thirsty lip,
As when the Egyptian deemed it heaven to sip:
And green the flags, and fair the lotus-flower,
As when that babe, within his bulrush-bower,
The embryo leader, fame's immortal heir,
Smiled on the royal maids who found him there."

To the history of what other country can one come with the delightful anticipations he may well bring to that of Egypt? To those who have visited that land, memory recalls its scenes with panoramic exactness and rapidity. To those whose journeys have been made by aid of books while sitting at their own firesides, imagination will present the

pictures she has painted with magic power—pictures of groves of stately palms slowly nodding their feathery tops in the lazy breeze, which nothing less lofty than themselves can feel; and orange trees, snowy with their bridal flowers or laden with golden fruit; pictures of the unbounded desert-sands, ever a striking emblem of a wasted life—no growth, no verdure, nothing telling of development or power, nothing reaching up toward heaven;—and there are trains of camels, stretching so far away that all shape and form is lost, while their towering burdens move steadily on;—pictures of swarthy men in fez or turban, with flowing garments and broad sashes of silk or cashmere, the ample folds of which conceal alike the sacred talisman, the precious jewel, and the glittering knife, while a sword or scimetar flashes by the side;—and veiled women, whose dark, dreamy eyes tell of that languid, houri-like beauty peculiar to their race and clime;—pictures, too, of noble mosques, with marble courts and flowing fountains, and their graceful minarets springing lightly into air; of bazars crowded with representatives of every nation that the sun shines upon; donkeys and donkey-boys, camels and their drivers; water-carriers, with full or empty goat-skins; women with their children perched astride their shoulders; elegant carriages, preceded by gaily-dressed runners, who clear the way with shining rods; sailors and soldiers, monks and sisters of charity, all jostling and crowding each other in these Cairene bazars, while the merchants sit cross-legged on their cushions, and smoke their pipes, or sip their coffee with an air of solemnity and wisdom.

All these pictures may be seen in living, moving reality in Egypt, and beyond this manifest life lies the study of a past, full of wonder and mighty import.*

THREE PERIODS.—Egyptian history, before the Persian conquest, is divided into three periods:

I. The old empire, from unknown antiquity to 1,900 B. C.

II. The middle empire, or that of the Shepherd kings, 1900-1525 B. C.

III. The new empire, 1525-525 B. C.

During these three periods, twenty-six dynasties, or families of kings, are on record; but sometimes two, three, or even five of these were reigning at once in different parts of the country. The kings of the fourth dynasty built most of the pyramids. These enormous masses of stone face the four main points of the compass; and one, known as the great pyramid, is so delicately adjusted for observations of the heavens that some wise men believe it to have been built by divine direction. The useful and elegant arts made great progress under the pyramid kings. The copper mines of the peninsula of Sinai were worked chiefly by captives taken in war; and the pictures on the tombs indicate a refined and intelligent life among the people.†

The early establishment of monarchical government in Egypt is indicated in Scripture by the mention of a Pharaoh as contemporary with Abraham. The full account which is given of the general character of the kingdom administered by Joseph, suggests as the era of its foundation a date considerably more ancient than that of Abraham's visit. The priests themselves claimed for the monarchy, in the time of Herodotus, an antiquity of above 11,000 years. Manetho, writing after the reduction of his country by the Macedonians, was more moderate, assigning to the thirty dynasties which, according to him, preceded the Macedonian conquest, a number of years, amounting in the aggregate to rather more than 5,000.‡

*Mrs. Clement's "History of Egypt."
†Thalheimer's General History.
‡Rawlinson's "Ancient History."

CONTEMPORARY KINGDOMS.—There were in Egypt during the early period, at one time two, at another three, at another five or even six, parallel or contemporaneous kingdoms, established in different parts of the country. For example, while the first and second dynasties of Manetho were ruling at This, his third, fourth, and sixth bore sway at Memphis; and, during a portion of this time, his fifth dynasty was ruling at Elephantine, his ninth at Heracleopolis, and his eleventh at Thebes or Diospolis. And the same general condition of things prevailed till near the close of the sixteenth century B. C., when Egypt was, probably for the first time, united into a single kingdom, ruled from the one center, Thebes.*

EARLY CIVILIZATION.—It is evident from the monuments that the civilization of Egypt at this early date was in many respects of an advanced order. A high degree of mechanical science and skill is implied in the quarrying, transporting, and raising into place of the huge blocks whereof the pyramids are composed, and considerable mathematical knowledge in the emplacement of each pyramid so as *exactly* to face the cardinal points. Writing appears in no rudimentary form, but in such a shape as to imply long use. Besides the hieroglyphics, which are well and accurately cut, a cursive character is seen on some of the blocks, the precursor of the later hieratic. The reed-pen and inkstand are among the hieroglyphics employed; and the scribe appears, pen in hand, in the paintings on the tombs, making notes on linen or papyrus. The drawing of human and animal figures is fully equal, if not superior, to that of later times; and the trades represented are nearly the same as are found under the Ramesside kings. Altogether it is apparent that the Egyptians of the pyramid period were not just emerging out of barbarism, but were a people who had made very considerable progress in the arts of life.

The governmental system was not of the simple character which is found in kingdoms recently formed out of village or tribe communities, but had a complicated organization of the sort which usually grows up with time. Egypt was divided into nomes, each of which had its governor. The military and civil services were separate, and each possessed various grades and kinds of functionaries. The priest caste was as distinct as in later times, and performed much the same duties.*

The genius of the Egyptians is chiefly shown in their architecture, which, for grandeur of proportions and the masses of material employed, has never been equaled. In the great hall of Karnak, the whole cathedral of Notre Dame could stand without touching either walls or ceiling; and the temple of Karnak is connected with the palace of Luxor by an avenue of 1,000 colossal sphinxes. Egyptian sculpture was rather huge than beautiful; yet there is an imposing dignity in the gigantic figures of kings who guard the entrances of some temples. In painting, the Egyptians aimed to represent facts rather than to please the imagination; and though the pictures in their tombs afford most interesting views of the daily life of the people, they are hardly to be considered as works of art.†

AGGRESSIVE WARS.—PYRAMIDS PERHAPS BUILT BY CAPTIVES.—Aggressive wars had begun to be waged. The mineral treasures of the Sinaitic peninsula excited the cupidity of the Memphitic kings, and Soris, the first king of the dynasty, seems to have conquered and occupied it. The copper mines of Wady Maghara and Sarabit-el-kadim were worked by the great pyramid monarchs, whose

*Rawlinson's "Ancient History."
†Thalheimer's General History.

operations there were evidently extensive. Whether there is any ground for regarding the kings in question as especially tyrannical, may perhaps be doubted. One of them was said to have written a sacred book, and another (according to Herodotus) had the character of a mild and good monarch. The pyramids may have been built by the labor of captives taken in war; in which case the native population would not have suffered by their erection.*

The process of building a pyramid was as follows: First the nucleus was formed by the erection of a small pyramid upon the soil of the desert. It was built in steps and contained a stone chamber well constructed and finished. Then coverings were added until the final size was reached, and at last all was enclosed in a casing of hard stone, deftly fitted together and polished to a glassy surface. The pyramid, thus finished, presented a gigantic triangle on each of its four faces.

The stone used for the inner structure was found near the place of erection, but as the work progressed, better material was brought from mountain quarries, and the vast labors thus accomplished are forcibly though silently told, by the numerous caverns in the Mokattam range, from which the finer stones were taken.

But the covering of the magnificent pyramid of Cheops, called in the inscriptions "Rhut" or "The Lights," was hewn out of the "Red Mountain" of Syene, or the modern Assouan, many weary miles from the wonderful monument it was to adorn.

This Syenite granite, hard as metal, and sprinkled with black and red, is capable of an exquisite polish, and was coveted by kings and architects as a crowning beauty to be added to their works. In the "Red Mountain" quarries the hand of the skilled workman may still be traced, by the marks of the chisel—the miner's hole—and, above all, by the giant statue and mighty obelisk still hanging there as if spell-bound, half released and ever striving to escape from the unrelenting clasp of the stony nature which enfolds them.

On the borders of the desert more than seventy such pyramids once stood, but that of Cheops so far exceeded all others in beauty, and so towered above them all that we may well fancy that, like the sheaves of Joseph's dream, the lesser ones bowed before it. There it still stands, in the midst of pyramids and tombs, the everlasting witness to the power of that great monarch of the distant past, with the grim sphinx not far away, as if to guard its secrets. It is a tomb entombed, for the yellow sand has been piled up about it by the winds of heaven, as if they would cover up and hide away this remnant of a people and a king, long since departed.

"The shadow of the pyramids
Fled round before the sun;
By day it fled,
It onward sped;
And when its daily task was done,
The moon arose, and round the plain
The weary shadow fled again.

"The Sphinx looked east,
The Sphinx looked west,
And north and south her shadow fell;
How many times she sought for rest
And found it not, no tongue may tell.

"But much it vexed the heart of greedy Time,
That neither rain, nor snow, nor frost, nor hail,
Troubles the calm of the Egyptian clime;
For these for him, like heavy iron flail
Against the palaces of kings prevail,
And crumble down the loftiest pile,
And eat the ancient hills away,
And make the very mountains know decay.
. . . . . .
He cursed the mummies that they would not rot,
He cursed the paintings that they faded not,
And swore to terrible Memnon from his seat;
But foiled awhile to hide his great defeat,
With his wide wings he blew the Libyan sand,
And hid from mortal eyes the glories of the land."*

*Rawlinson's "Ancient History."

THE SPHINX.—The great Sphinx is not far distant from the pyramid of Khafra, and the name of this monarch is mentioned upon the slab or memorial stone which bears the inscriptions. This does not prove that the "Lion of the Night" (as the Arabs call the Sphinx) was made by command of Khafra.

The Sphinx has the form of a lion and the head of a man. It is cut out of the solid rock with the exception of the forelegs, which were hewn out and added, and extend fifty feet from the breast. A memorial tablet records the fact that Thutmes IV built a temple at the breast of the Sphinx, as a gift of honor. This temple has been excavated, but the desert sands soon bury it from sight. Pliny says that this Sphinx was without doubt a local deity, and was treated with divine honors. It is now known to be a representation of Hormakhu, which is to say "Horns on the Horizon," or the sun-god of Heliopolis.*

* Mrs. Clement's "History of Egypt."

GEOLOGY.

CHAPTER III.

People commonly think of the land as firmly fixed, of the sea as changeful—this is a mistake. We see the tide ebb and flow twice a day; human life, man's history, is too short to measure those vaster, but less regular movements which raise and lower the solid ground. Yet there is probably not a spot on the known surface of the earth, which has not been deep under water at least once since the time when geological history begins. Why these motions take place it is hard to say. It has been conjectured that great masses of rock under ground have been melted by the heat of electric currents or chemical actions, which, swelling as they became hotter, have pushed up the strata above. But when we examine any tract of uplifted land—for example, a great mountain chain like the Alps—the strata composing it generally seem to have been puckered up by a sideward pressure rather than lifted from below; just as are the leaves of an unbound book, if you put one hand against the back and another against the front and bring them together. Now, if the earth has been cooling down and consequently getting somewhat smaller; and if the outside first became solid, then the crust, when once formed, must pucker itself to fit the shrinking interior, like an apple wrinkles in withering; or else, sooner or later, the one must part from the other, like a kernel in a nutshell.

Be this as it may, the surface of the earth is by no means at rest, but two sets of forces are always at work upon it: the one from within, sometimes bringing up the low, sometimes bringing down the high; the other from without, never exalting, always abasing. The former possibly sometimes pauses for a while, the latter never rests night or day. There is nothing conservative in Nature; she is a relentless leveller.

Forces from within manifest themselves in three ways:—

(1) By piling up hills of igneous rock, called volcanoes, from which are ejected streams of lava.

(2) By earthquakes.

(3) By gentle, and often almost imperceptible rising and falling of the land.

Forces from without do their destructive work by heat and cold, rain, ice, rivers, ocean waves, and currents.

(1) A volcano is a mountain from which, from time to time, steam, ashes, stones, and molten lava are discharged. Its summit is formed by a conical mound, enclosing a bowl-like hollow, called the crater. The crater is at the mouth of a natural funnel communicating with the interior of the earth, and the cone consists, wholly or almost wholly, of stones and ashes that have been vomited forth from the mouth of this pipe. In some volcanoes the molten matter is always bubbling up in the neck, so that the crater is like a seething cauldron; in others the supply ceases from time to time, the surface cools and hardens, the furnace mouth becomes plugged, and only a little steam or smoke tells of the buried fires. Perhaps even this at last ceases, grass begins to clothe the surface, trees strike their roots among the rocks; so is it now with Mount Gargano, near Naples, so it was once for centuries with Vesuvius. But one day there is an awakening. Strange sounds are heard, the weather is disturbed, the water sinks in the neighboring wells, the earth trembles; cracks open here and there on the mountain side, a lurid light gleams out from them. The pent-up fires can no longer be restrained; in a series of fearful explosions, perhaps in a very few minutes, the stopping is blown out of the furnace mouth; dust, ashes, red-hot rocks are hurled high into the air, and at last, either from the crater or from some chasm in the mountain side, streams of lava issue forth and roll downward on their destructive course. Sometimes a large part of the cone itself is carried away by these explosions—just as neck and cork often fly together from a bursting wine bottle. This happened with Vesuvius, in the great eruption of 79 A. D., when, after unknown centuries of repose, it exploded, blew away half the wall of its crater, and buried Herculaneum, Pompeii, and other places of less note. Not unfrequently the flanks of a volcanic mountain are studded with a number of little cones, each copies of the principal crater, which also discharge steam, ashes, and occasionally lava. A model of Etna looks as if the mountain were suffering badly from boils. Volcanic mountains sometimes stand alone, like this Etna, which towers up more than ten thousand feet above the plains of Sicily; sometimes form long chains, as in the Andes; sometimes clustered groups, as in the Lipari Isles, where no one summit much overtops the rest. Happily, we have no volcanoes in our own land, but Geology tells us this was not always the case. To take one instance only, Staffa, and many an island of Inner Hebrides, are but fragments of great lava streams; Edinburg Castle is built on a basalt crag, and Arthur's Seat itself is but the worn-away cone of an extinct volcano. In Auvergne, within a long day's journey of London, you may see cones and lava streams so perfect, that one could readily believe them scarce a century old, though no serious, if any, disturbance has taken place for at least two thousand years.

Two or three instances will suffice to show how large a mass of matter can be discharged from a volcano. In less than a week, in the year 1538, Monte Nuovo, a hill in the Bay of Naples, nearly 450 feet high and about a mile and a-half round at the base, was thrown up; in an eruption of Jorullo (Mexico), in 1759, a mass of lava was ejected which formed a cake covering four square miles, and full 550 feet thick in the middle; a lava stream which issued from a side crater of Monte Loa (a huge volcano in the Sandwich Islands, 14,000 feet above the sea) forced a passage under ground for twenty-seven miles, sending up on the way one or two offshoots to mark its progress, and then, after running twelve miles more, poured down into the sea. Perhaps, however, the most tremendous lava discharge on record, took place from Skapta Jokul, an Icelandic volcano, in 1783, when two streams were ejected—one more than fifty miles long, and in places as much as fifteen wide; the other about forty-five long and seven wide: the thickness of these varied from one to six hundred feet. Probably enough lava was discharged in this single eruption to cover the whole of Norfolk with a layer about one hundred yards thick.

The earthquake, though often more destructive to man and his works,* does not, so far as we can tell, generally produce such marked effect upon the surface of the globe; still, considerable changes are often wrought by its action: large masses of rock or soil become detached from the hills, chasms open in the ground—as in the terrible Calabrian earthquake of 1783, when, in a single year 949 shocks, more than half of these being of great severity, were felt; or, what is still more important, large tracts of land are elevated—as has happened more than once in Peru and Chili; and as in New Zealand, where, in the earthquake of January 23, 1855, a district as large as Yorkshire is believed to have been raised from one to nine feet†—or are depressed, as in the Runn of Cutch (at the mouth of the Indus), when as much land as the counties of Stafford and Leicester together sank under the sea.

The precise cause of volcanic eruptions and earthquakes can as yet be hardly regarded as settled, and the subject is one of great difficulty. At present it will be enough to notice that there is evidently a close connection between them. Earthquakes are probably due to subterranean explosions, and in some cases it has been found possible to estimate the position of these. Volcanic eruptions, by whatever cause produced, appear to be inactive without water; for it can hardly be an accidental coincidence that all the existing volcanoes are near the sea or very large sheets of water.

But, apart from these comparatively sudden changes, a slow rising or falling of the earth's surface, without any shock, and sometimes far away from any volcano, has been occasionally observed. This is probably far more common than is generally supposed, but the change is so gentle and gradual that it passes unnoticed. There is, however, no doubt that the shores of the Gulf of Bothnia are slowly rising, nowhere more than at the rate of a yard in a century; while part of the west coast of Greenland is as quietly sinking. The most noteworthy example is the so-called Temple of Serapis, on the shores of the Bay of Naples, which has been often described. Here are three upright columns, part of a ruined building; when these were first examined in 1749, they were found to be buried to a height of twelve feet from the pavement in volcanic ash and other deposits; then, for the next nine feet, they were drilled full of holes made by marine boring shells. Now these facts can only be interpreted thus: we may assume that when the temple was built, its floor would hardly be below high-water mark; after it fell into ruin, the floor must have been covered by these deposits, some of which were certainly formed under water; the columns must then have continued to sink, until the sea was above the highest boring, that is, till at least twenty-one feet were under water, after which they must have been again upraised; and all this so gently that even now the columns are as nearly as possible upright. We happen to know from history that the building was completed A. D. 235, that, not improbably, it was ruined either by Alaric in 410, or Genseric in 445, and that the deepest depression of the land was before the year 1503. When the columns were uncovered in 1749, they stood about two feet higher above the water than now, and the ground is probably very slowly sinking again.

These changes, however, which have happened since his-

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*60,000 persons are said to have perished, in a few minutes, in the great Lisbon earthquake, November 1, 1755.

†Lyell, "Principles of Geology," ch. xxviii.

tory began to be written, are as nothing compared with those which have taken place in the long series of ages covered by the geological record. Mountain ranges have been raised like gigantic billows; two of the largest, the Alps and the Himalayas, being comparatively modern. In this process, vast thicknesses of rock have been puckered, twisted, doubled up, sometimes even folded back; they have been squeezed and crushed, and cracked and broken, so that ends are now fitted together which once were some thousands of feet apart. Looking at these tremendous instances of force, which has bent the hard rocks as though they had been clay, the natural impulse is to suppose some mighty catastrophe, which has convulsed our planet and hurled the mountains on high, like blocks dislodged by the explosion of a mine; but the more we examine the matter, the more convinced we become that the pressure which bent, often so regularly, those banded rocks, must have been very gradually applied, or they would have snapped and been shattered into fragments. At times, doubtless, a portion may have suddenly yielded to a long-continued strain, but the effects of this would be—as an earthquake now is—comparatively local; thus the modern geologist concludes, "I see little in Nature which bears evidence in favor of catastrophes, and nothing which, giving time enough, may not have been brought about by the agents of change still at work upon the globe."

I have left unexplained a few geological terms which it will now be convenient to define before proceeding further. From what has been said above it will be seen that strata do not always lie horizontally; when, then, they slope downwards in any direction, they are said to *dip towards* it at such and such an angle. Thus, "Dip 30° N. E." would mean that the stratum sloped towards the N. E. at an angle of 30°; or, to put it otherwise, that the angle between the plane of the stratum and that of the horizon was 30°, and that the plane in which this angle was measured pointed to the N. E. Take a sheet of note-paper, hold it with one leaf horizontal, the other hanging down; the acute angle between the two leaves is the dip of the lower one. The line of junction of the two leaves, or the straight line in which the plane of the bed cuts the plane of the horizon, is called the *strike* of the stratum. It is clearly at right angles to the plane in which the dip is measured, so that a bed dipping to N.E. or to S.W. has a strike from N.W. to S.E. The line in which any stratum cuts the surface of the ground is called the *outcrop*. Whether this is a straight line or not at any place will depend upon the form of the surface there; if that be a plane, then of course the outcrop will be a straight line, and coincide with the strike. When strata are bent or folded, they are often said to be *contorted*, and when doubled completely back, so that for a space the older overlies the newer, are said to be *overthrown*. When strata are rolled or bent, the top of one of the folds, that is, the line from which the strata dip in opposite directions, is called an *anticlinal* line or axis. Open this book in the middle, place it on the table, with the binding at top, like a ridge roof; then, if the book represents a stratum, the back is an *anticlinal*. If the strata dip from either side toward a line—as these two pages of this book, when it is partially open, do towards the middle fold—this is called a *synclinal*. When strata (as mentioned above) have been broken across and the ends wrongly fitted together, they are said to be "faulted." Sometimes the faces of a *fault* fit closely together; sometimes they are apart, and the intervening space is filled up with rubbish; sometimes the fault is vertical, sometimes not; sometimes the beds remain parallel after displacement, sometimes not. In a sloping fault the plane of the fault almost always makes an acute angle with the under side of the stratum that has been depressed; in miners' language, the fault "hades to the downthrow." Where the angle thus made is obtuse, it is said to be a reversed fault.

Faults, though frequent in mountain regions, are by no means confined to them. There are few parts of England where some faults may not be found. There are little faults as well as great faults; some of the latter in Britain have displaced the beds vertically (have a *throw*, as it is called) for several hundred feet. Perhaps the largest known in the world is in the Appalachian chain (United States), where on opposite sides "of a crack over which a man can stride," beds are brought together that once were 20,000 feet apart.*

The immediate cause of faults is probably just the contrary to that of contortions—the former resulting from strain, the latter from pressure.

The two faces of a fault are often polished and grooved by rubbing on one another; this peculiar surface is called *slickensides;* it is often found where the rock is not faulted, but is only parted, and may be met with in all hard rocks, and even in tolerably stiff clays.

The finer ashes thrown up by volcanoes are often carried for long distances by the wind, and then settle down into the water, or are carried by streams into the sea or lakes—thus beds of stratified ashes are formed. When the materials are coarser and less regularly disposed, as would happen near a submarine volcano, the deposits are termed *tuff*. A mass of lava poured out on the surface of the ground is called a sheet, stream, or flow, and the wall-like mass which fills up the crack by which the lava has reached the surface is called a *dyke*. These dykes occur in thousands along the shores of the west coast of Scotland and the Inner Hebrides, and are abundant in the coal-fields of Fife and the Lothians; the north of England also shows some examples, the southernmost of them reaching the sea south of Whitby, after running in a tolerably straight line across the country for sixty miles.

Before glancing at the various agencies by which the surface of the earth is shaped,—rain, rivers, seas, ice, and glaciers—by wearing away or "denuding" some portions and transporting their materials to other places, it may be well to call attention to the fact, that the results of the denuding forces greatly depend on the structure of the rocks, whether stratified, cleaved, foliated, or jointed. The mineral composition and structure, whether coarse or fine, crystalline or not, is of much importance, so that it may be worth while to call attention to one or two points connected with them.

(1) With regard to the Igneous rocks. The texture of these chiefly depends upon the circumstances under which they have cooled: if quickly, they will have a glassy or finely-crystalline structure; if slowly, they will be coarsely crystalline. This change of texture may often be seen in examining a dyke of Igneous rock; for a couple of yards will make a great difference, the outside part being glassy, the inside coarsely crystalline. When the melted rock has cooled down without any pressure, then it is likely to be loose in texture, full of gas blebs, cindery, or slaggy. This may be seen on examining the surface of a lava stream. It has also been shown by experiment that crystalline structure depends on the mode of cooling. Basalt from Rowley Regis (Staffordshire) was melted in a blast furnace and then allowed to cool; the outside of the mass was found, on examination, to have become a black glass, the inside a crystalline stone.

(2) The Aqueous rocks. The texture of these depends partly upon the size and shape of the water-worn materials, partly upon the cement that binds them together. Large rounded pebbles can not adhere together; but pressure alone may sometimes solidify fine earthy materials, just as the

* "Frost and Fire," ii. 338.

leads for pencils are made from compressed graphite powder. Clays after being wetted will "set" in drying, as happens with sunburnt bricks. But in a great many rocks, and in all the hardest, the water-worn materials, whether fine grains or large pebbles, are set in a cement; thus the rock is a kind of natural mortar or concrete. This cement has been brought by the water which found its way into the rock during or after its deposition, and is generally made of silica, oxide of iron, or carbonate of lime. The microscope shows these minerals binding the various grains of the rock together like a paste.

CHAPTER IV.

We now come to the various agents by which Nature is ever bringing down that which is high. Everlasting as the mountains may seem, with their towering peaks and rocky cliffs, not a moment passes without some fragment being broken off and carried away towards the plain below. Were it not for those movements of the earth's crust, of which I have spoken, sooner or later all things would be reduced to one dead level. Heat and cold, water and ice, are the agents by which the rocks are quarried, transported, and at last deposited in the tranquil depths of lakes and seas. For the sake of clearness, we will as far as possible consider their actions separately.

A piece of damp rock shrinks in drying, and in shrinking often cracks. You have no doubt often noticed how the mud in a dried up pond is split into blocks, or how the paths in a hot summer are parted by large cracks. In warmer climates than our own this is still more remarkable. Professor Ansted* tells us that in the south of Spain during a dry season fissures are formed, even in compact sandstone, some scores of yards long, and from eight to ten feet in depth; and in loose marls these run a mile or more in length, and as much as a hundred yards in depth.

Again, when a rock is dry it expands with heat, and contracts with cold; in this way also cracks may be formed, or neighboring masses forced from their places. In countries like Canada, where the summer and winter temperatures are very different, this expansion and contraction is found a serious practical difficulty in the construction of buildings where large stones or girders are used. The same effects must occur in nature. Frost, however, produces more marked results when it can act with water as an instrument, so we shall return to this subject again when considering the effect of ice.

The sun is continually pumping up water from every stream and lake and sea. Converted by the heat into an invisible vapor, this rises with the warm air up into the sky, until at last, on reaching colder regions, it gathers into clouds and returns again to the earth in the form of rain. You can prove this invisible work of the sun, if you like, by a very simple experiment. On a fine summer morning fill a pair of glasses with water till they exactly balance one another. Then place the one on the shady, the other on the sunny side of a house. In the evening again weigh them, and the latter will be much lighter than the former. The rain, as it drips down the slopes, carries down some of the loose earth with it. Watch the effect of a shower on any bank of soil, and you will quickly see this for yourselves. So great is the effect of rain alone, that it is often found necessary to fix on the embankments of Alpine railways a network of wattles to prevent them from being washed away, until plants spring up to bind the soil together with their roots, and clothe them with a defensive armor of herbage and shrubs. The best instance of the effect of rain alone may be seen in what are called earth-pillars. These, which are not very rare in the Alps, are thus formed. The bed of a valley has at some former time been filled up by a quantity of clay, in which a number of stones are mixed, some of which, in the upper part, are of considerable size. A rill of rain-water when it comes against one of these is stemmed, and parted to right and left, to unite again further down. Then, when the earth is washed away from both sides of the block, the rill still works on in the same channels and slowly saws away the earth, leaving a block of it beneath the protecting capstone. Thus, by degrees, a pinnacle is carved out. I have seen some of these not less than thirty or forty feet in height, and crowned by blocks a couple of square yards in area. The same kind of action, though with less conspicuous results, is everywhere going on. See how a road is washed by a thunder shower bare to the "metals," and how muddy a streamlet rushes down the gutters, how earth slips and stones roll from every unprotected slope. Each change produced by a shower may seem but trifling, but remember this goes on week after week, year after year, and, as the proverb hath it, "Constant dropping wears away stones."

The effect even of rain as it beats upon the rocks or soaks into them in descending underground is by no means unimportant. The surfaces of sandstones and limestones exposed to the air are always more or less rough; if you examine them closely you will find that the cement has "weathered" away and the embedded particles are sticking out. In oolites the rain first separates the "eggs" in the stone one from another, and then peels off their shells coat after coat; granites, basalts, and most igneous rocks rot under the influence of the weather, losing so completely their usual characteristics, that they might almost be mistaken for gritty, rusty clays. I have seen granite and basalt that you could crumble in the hand, and instances have been described where the former rock could be dug out with a spade to a depth of several feet. The ruined tors of Cornwall and Devon, probably also the "rocking-stones," are the results of atmospheric denudation acting upon a rock whose masses, as is common in igneous rocks, have a spheroidal or ball-like structure.

Indeed, the effect of rain is not confined to the surface of rocks, but it often extends very deep into the mass. The aqueous rocks, as we have said, consist of grains embedded in various cements. The water, in sinking through the rocks, can wash them away. Silica paste is most durable, but even this yields at last; carbonate of lime goes readily. But besides this, water, which, as I have already said, is never pure, but has various gases and minerals dissolved in it, produces chemical changes in the rock.* Thus, as when hydrochloric acid dropped on limestone (carbonate of lime) drives out the carbonic acid (which goes away with a fizz, as if it went off in a huff) and makes a new combination, so in the course of time one mineral may be entirely removed from a rock, or, if not, may be changed into something quite different. The igneous rocks are greatly affected by these processes; the water attacks the minerals of which they are composed, removes some parts, alters others, so that the hard basalt, etc., is quite changed. You will find this takes place almost always on exposed surfaces and along joints, in fact, wherever water has pretty free access. Even in the heart of the stone some change is generally produced, for there also sooner or later water makes its way It is often no easy task to get a specimen from old igneous rocks which under the microscope does not show signs of change.

* "Transact. Cambridge Philosoph. Soc.," vol. xi. p. 387.

*For example, carbonate of lime is not soluble in *pure* water, but this, in contact with water containing carbonic acid (like all natural waters), becomes a bicarbonate of lime, which is soluble.

One or two instances may be added in order to illustrate the effect of water upon rocks, especially in the former of the above modes. Rain, as it has been said, in sinking into the ground, makes its way either through the mass of the stone, or through divisions in it, such as laminæ or joints; some rocks readily allow the water to pass, others, as clays, do not. If, then, it meet with a stratum which can not be penetrated, it must slowly drain off, and make its way underground by the easiest passage, just as it would do above. By this means it is often brought again to light in a hilly country. This is the cause of a spring.

In mountain districts, as the Alps, it is not uncommon to see a large spring or a line of springs breaking out of the face of a cliff just above some clayey bed of rock. Some of these may proceed from subterranean streams; for even rivers, which flow over a very porous or fissured bed, are not unfrequently swallowed up. Sometimes these can be identified, when, after a while, they again emerge, but in others all trace of them is lost. As these streams pass under-ground they, of course, dissolve and wear away the rock; thus many caverns are formed, through some of which the stream may still be seen flowing, while others are dry since the waters have found a different outlet.

One of the most interesting examples of the dissolving power of water are the sand-pipes which may be seen in many chalky districts. These are large tubes, more or less regular in form, often several feet wide and some yards deep, which are filled with sand or gravel. It is quite impossible to attribute these to any other cause than water, which has slowly dissolved away the chalk, and, as it were, dug a well for itself. As the rock disappeared the materials above slowly settled down, filling up the hollow as fast as it was made. These pipes occur in other limestones as well as in chalk, and even in some gravels. The swallow-holes, and curious fissures and hollows which are common in many limestone districts, as, for example, in the northern parts of Lancashire, are simply natural water-pipes; in some cases a stream plunges into them, but many of the smaller are formed by the rain drainage of a few square yards of rock. In the Eastern Alps are whole districts, some miles in extent, where there is not a single stream, and the rock is completely honeycombed with holes which swallow up the whole drainage.

When the runlets are gathered into streams the work of destruction goes on more rapidly. Walk by the side of any river which is wandering through a valley; why is it that at every curve the banks are steeper on the outside than on the inside of the bend—that there are cliffs with deep water below on the one side, slopes and shoals on the other? Because the stream as it sweeps round the curve runs more quickly—as you can easily see it must—on one side than on the other, striking the right-hand bank with the greater force, when turning to the left, and *vice versâ*. (Swift streams run in direct courses, slow streams in winding, just as they should do if they determined their own channels.) Some geologists still hesitate to assign to rain and rivers the principal part in sculpturing the earth's surface, but all must admit that their effect is very great, and that once give a stream a channel, it will continue to shape and deepen it. Where a torrent is rushing between narrow cliffs, we may often see in its bed rounded hollows, called pot-holes, worn out by stones, which are whirled round in the eddies, and may observe on the walls many yards above remains of similar hollows. If the stream made the one, and this no person can doubt, ought we to assign a different cause to the other, because it is now many feet away from the water-bed? All we have to do is to make sure of being able to recognize a torrent's tool marks; this done, we need not be startled at our conclusions. Give it time enough, and the stream can do the work. Those narrow gorges in the rocks of mountain countries—Dungeon Gill, in Westmoreland, Pfeffers, Trient, Sottaguda, in the Alps (even if possibly commenced in fissures), in their present form have been and are being sawn out by the streams which are running down them. Startling as it may seem, those tremendous chasms in the Colorado valley called cañons, where the torrent sometimes for a couple of hundred miles rushes between rocky walls from two to four thousand feet in height, have in all probability been sawn out in the same way.

Let us examine more closely the mode in which this work of destruction is carried on. The water has a twofold action upon the rock over which it runs. (1) By dissolving it. Many of the minerals that enter into the composition of rocks—some silicates, and, most of all, carbonate of lime—are dissolved and taken up, though slowly, by water. Drop a lump of sugar into a tumbler of clear water; after a while it has disappeared and the water seems the same as before; but the taste tells you the sugar is there, and if the water were dried up it would appear again. So it is in nature. (No natural water is quite pure.) Mineral springs have obtained their ingredients from the rocks through which they have passed. (Spring water in limestone districts contains carbonate of lime, as is shown by the so-called "fur" deposited in kettles and boilers.) All this has been dissolved out of the rock. Thus the stone is, as it were, licked up by the water; and as these soluble parts often form the cement that binds together other particles which can not be dissolved, these are loosened, are washed from their setting, and carried away by the stream.

(2) A stream acts in another way even where it has little or no power to dissolve. As it chafes and rushes over its bed it rubs the rock away from which it seems to rebound. Still more does it do this when its waters sweep along sand and stones—the dirtier the stream the faster it can saw. As you may see in any stoneyard, workmen saw the hardest rocks with a plate of iron, whose edge is kept swinging through gritty water; rock may be drilled by a stream of sand, directed by an engine; nay, even the basalt rocks on the shore of Fife are polished by the sand as it is driven over them by the easterly gales.

We may next briefly consider the effect produced in the form of valleys by the structure of the rock. If it is horizontally stratified or uniform in texture, and of a nature to resist weather action, a stream will simply saw out a groove with precipitous sides; and as the (middle part of a stream runs quicker than the sides,) the bottom of the groove will be rounded; so the gorge in section will be a tall **U**. In softer rock, which weathers faster, the valley will become a **V**. The point is, of course, generally either a little rounded as before, or if the stream be wide or change its course, the section becomes a ∪. In a curving stream the slope of the two legs of the **V** will vary, as explained above. Suppose, however, that the strata are not horizontal, the joints, if any (and there are almost sure to be), will not be vertical. These divisions will guide the stream to some extent, and so the one side of the valley will always be steeper than the other, and the stream will keep edging away toward it. The rain and frost will have more effect on the sloping side than on the steep one, the stones being so much more easily displaced on the former.

A not uncommon form of valley in mountain districts is the **Y**. This will result from the upper rocks being softer or more easily destroyed than the lower. (Rapid streams run a straighter course than slow;) those endless windings are most common in comparatively sluggish rivers or in very yielding ground, where every obstacle can divert the stream. Once turned from the straight course it swings like a pendulum and repeats the curve again and again.

Strange then as it may seem, we are doubtless right in

asserting that the rivers in the main made the valleys rather than the valleys the rivers. I mean that, though the original configuration of the ground to some extent determined the course the water should follow, the only tool marks now visible are those of the stream itself—not, indeed, always quite the same stream. Many valleys, at any rate in Europe, appear to have been cut out by rather larger rivers than now run down them. As, however, during the long epochs in which the work has been carried on, the rainfall, slope of the ground, and other causes that would affect the speed and size of the stream would be likely to alter, this is not surprising; and, as you will see when you know the latter part of geological history better, is just what we should expect.

It may be well to notice that the destructive power of rain and rivers depends very much not only on the amount of rain that falls, but on the manner in which it falls. If, for example, a tenth of an inch of rain fell every day, that would produce but little denudation; the rain would have no force, the streams generally run smoothly, and the slopes be covered with herbage. Suppose, however, the whole quantity of 36½ inches came down in about three weeks. Before this heavy downpour occurred, the slopes would have become dry and arid, with no blades of grass to break the force of the raindrops, no vigorous roots to bind the soil together. Suddenly every gutter would run bucketsful, the streams that had been languidly wandering along their stony beds would be swollen torrents, the waters, headed back in narrow defiles, would pour themselves in floods over the country, and denudation would be rapid. When you read Sir Charles Lyell's great book, "The Principles of Geology," you will find proofs of this. I will quote one. "In the Kasia Mountains (Eastern Bengal) the enormous quantity of 500 inches of rain falls yearly, and almost all of it during six months."* (Ch. xv.) This, then, is the result. "The channel of every torrent and river is swollen at this season, and much sandstone horizontally stratified, and other rocks are reduced to sand and gravel by the flooded streams. So great is the superficial waste (or denudation) that what would otherwise be a rich and luxuriantly wooded region is converted into a wild and barren moorland."

But rivers also play a most important part in transporting materials. We might say that Nature sends all her goods by water. A stone under water does not press so heavily on the ground as it would do on land; and wet surfaces are less rough than dry; so that a pebble on the bed of a river requires a less force to move it. For example, even a stream which runs at the rate of 300 yards an hour can tear up and sweep along fine clay, while one whose pace is twelve times faster, will carry with it stones as large as a hen's egg; the former is less than the most sluggish, the latter more than the most rapid, *average* pace of European rivers. Let us follow, for a moment, the course of a block from the mountain side: undermined by the stream or loosened by the frost, it falls into the torrent which is leaping down its rocky bed; dashed against this, its angles are worn away; probably it is sooner or later broken into smaller fragments, if not, it will be stranded as soon as the pace of the torrent slackens sufficiently, and will then be worn away very slowly by the rasping of sand and silt and the smoother touch of the water itself. Otherwise the broken parts will be carried on, in some cases to be again divided, in all to be gradually rounded into pebbles. As the slope decreases and the pace of the stream diminishes, now one and now another fragment will be dropped as too heavy, forming a new paving stone for the bed of its channel, but the finer gravel, sand and silt, will be hurried on. Suppose now the river enters a lake: its pace slackens at once, and the materials it was sweeping along sooner or later settle down to the bottom. Thus the head of the lake is gradually filled up, a marshy plain is formed, which is often flooded, and the land slowly gains upon the water. This river-made land is called a *delta*, because its triangular shape resembles the Greek letter Δ. The same thing happens when the river enters a sea, where there are no strong currents. It is only a question between the strength of the river and the strength of the sea as to whether the delta will increase quickly or slowly or not at all; whether or not the latter can cart away faster than the former can quarry and shoot out its load. English rivers have practically no deltas, because the climate is not very favorable to denudation, the rivers are not strong enough to bring heavy materials, and the coast is swept by rather rapid tidal currents. Thus English soil mostly finds a resting-place deep in the German and Atlantic Oceans. But many of the great foreign rivers have large deltas, which you at once see on any good map, as the Rhone, Po, Nile, Mississippi, Ganges. Egypt, "the gift of the Nile," is little more than one great delta. That of the Ganges (with the Bramapootra) is about 216 miles from the sea at its head and 224 miles wide at its base. The marshy uninhabitable part alone is as large as Wales, through which the river pours its waters in eight great channels. To give some idea of the great extent of this river portage, Sir Charles Lyell tells us it is estimated that not much less than six thousand four hundred million cubic feet of solid matter is every year poured into the Bay of Bengal, enough to make forty-two hills as big as the Great Pyramid, or to cover 172 square miles with a coat of mud one foot thick.

Besides this, the rivers carry a considerable quantity of mineral matter (chiefly carbonate of lime) dissolved in their waters. Hagen* estimated that the Rhine every year carries into the sea enough carbonate of lime to make 332,539 millions of full-grown oyster-shells. This mineral matter is not generally deposited from the water, but is separated from it by various living creatures, which thus are able to form their shelly coverings; these, when they die, sink to the bottom, and help to form the limestone of the future.

* The rain fall of the east of England is about twenty-five inches a year.

CHAPTER V.

The sea is another important agent of change. Its waves batter down the ramparts of the land, its currents sweep the fragments away, its tranquil depths receive at last the materials. Its waters are never at rest; the gale lashes them into angry billows, and on the calmest day "Ocean's cheek" is "ever dimpling."

As a destructive agent, it acts chiefly by the force of its waves; marine denudation, therefore, takes place mainly on exposed coasts, in sheltered inlets it is very trifling. In the Norway fjords, rocks smoothed (as will be presently described) by glaciers long ago melted away, may be seen sloping down to and below the margin of the water. Yet on that same coast, whenever a headland is rounded which is exposed to the full force of the Atlantic rollers, there is an instant change in the scenery, and, as at Stadtland, or on the western coast of the Lofoten Islands, the curving domes of ice-worn rocks give place to steep cliffs rifted and torn, as though by the claws of some sea monster. Many parts of the English and Welsh coasts show the power of the sea. The Scotch, as at Ardnamurchan Point and the Mull of Cantyre, exhibits it almost as well as Norway. Nowhere, however, is the force of the waves greater than on the storm-beaten headlands of the Pentland Firth. Here,

* Bischof. "Chemical and Physical Geology," vol. i. p. 80.

as Professor Geikie tells us,* the waves have been known to "run bodily up and over the vertical cliffs, 200 feet in height, lodging portions of wrecked boats, stones, seaweeds, etc., on the top." They have "torn up masses of rock, sometimes 8½ tons in weight, and have heaped them together at a height of no less than sixty-two feet above high-water mark." They have quarried blocks at least as large out of their beds, at a level from seventy to seventy-four feet above the sea; some at lower levels they have hurled over "abrupt opposing faces of rock as much as seven feet in height" nearly five-and-twenty yards inland; others they have shattered into fragments.

The cliffs are scarped into strange fantastic shapes, and pierced with deep caves. Here and there ridges harder than the surrounding rock have held out longer than it against the repeated assaults, forming reefs and skerries. These are worn into ruinous heaps, and sometimes absolutely breached by the waves. In one district of Skye the rocks are intersected by numerous dykes; these in one part have yielded to the billows, so that the cliff looks like a row of towers, in another they have resisted and stand out like walls. Instances of this wave-power may be found on every rock-bound coast; the chalk cliffs of Dover, Flamborough, and Freshwater, the limestone wall of Portland Bill, and the Great Ormeshead,—hundreds of others too numerous to mention, especially on the western and south-western shores of Britain,—have all been quarried out by the waves. The needles in the Isle of Wight, just as the Arch and the Stag's Leap at Freshwater Gate, are fragments that the sea has not yet devoured. On the last rock a patch of turf still remains, corresponding in all respects with that on the edge of Afton Down, which is now some hundred yards away.

The annals of many places tell us how the ocean is making slow but sure inroads upon our coasts, and this "little jewel set in a silver sea" is being slowly corroded by that setting. Some day you may have the opportunity of reading them in detail in Sir Charles Lyell's great work, where he traces the action of the sea round our coasts. I will now quote, and that very briefly, only two instances. The cliffs at Sherringham in Norfolk are destroyed at the average rate of at least a yard a year. In 1829 there was at one place in the harbor water twenty feet deep, where only forty-eight years before there was a cliff fifty feet high with houses upon it. Reculver Church, on the Kentish coast, now stands on the brink of a cliff about twenty-five feet high. In Henry VIII's reign it was nearly a mile inland. A drawing published in 1781 shows that a considerable strip of land, with two buildings upon it, even then lay between the church and the sea. Part of the churchyard was washed away in 1804, and the church itself would have gone long ago, if, owing to its value as a landmark, the base of the cliff had not been protected by a sea wall.

The sea destroys principally by battering; its waves in violent storms have been known to dash upon the coast with a force of three tons on the square foot. It tears, as above described, great blocks from their bed, shatters them to fragments and hurls them again and again against the cliffs, which thus furnish weapons for their own destruction. Frost and other natural agents also detach blocks, and so aid in the work of ruin and supply of artillery. Sometimes, however, it happens that these rather impede the work; the blocks may fall from the cliffs faster than the sea can grind them up and sweep the grist away; then a talus or slope of rock is formed at the base of the cliff, a natural break-water, which the waves must breach before they can again begin to undermine.

* "Scenery and Geology of Scotland," p. 61. A delightful book, which will give the student much valuable and suggestive information.

Some effect, no doubt, the moving water alone has, but this does not seem great, for even on exposed headlands the rocks are often clothed with seaweeds and corallines, which could hardly establish themselves if—as in a torrent bed—the whole surface was being worn away. The water also, in the case of some rocks, may dissolve away, and, as it were, rot them, but sea water appears to have, in some instances, quite the contrary effect. Hence we regard the sea chiefly as destroying by battering. The fragments broken from the land are swept along by the currents and worn into pebbles, and ultimately into sand. The process may be easily watched on any shingly beach. Each wave that breaks drives the pebbles upwards with a dull crash, and as it retreats draws them rattling downwards. If ever you have "eight hours at the seaside," spend a little of them in watching the angular flints from the Sussex cliffs ground into smooth pebbles on the Brighton beach.

The waves are principally raised by the wind; without that the sea would have little destructive power, but it transports materials chiefly by currents. These are to the sea what rivers are to the land. Space does not allow us to enter into detail upon their cause and history; for the present it must suffice to indicate very briefly their principal causes and general extent.

Tides are one most important cause of currents. Twice a day, as any book on astronomy will explain to you, the joint attraction of sun and moon causes a great flattened wave to traverse the ocean. In deep open seas this probably does not give rise to many currents, but nearer land, where a gradually narrowing inlet and shallowing shore hems in the tide wave and increases its effects, a difference is produced between high and low water of thirty, forty, or even (in a few cases) more feet.* This great change in the level of the water can not take place without producing considerable currents, by which the materials from the coast will be transported. Again, since in hot regions the sun, as was said above, pumps up the water, that from colder districts, where this process does not go on so fast, must flow in to supply the place.

For example, it is calculated that the sun every year removes a layer of water eight feet thick, from the Red Sea. Hence the Red Sea must either gradually be drying up, or water must flow in through the Straits of Bab-el-Mandeb to maintain the level. Again, sea water when warm occupies more space than when cold, and so bulk for bulk is lighter; this must cause currents in the sea, just as fire makes draughts in a room. Again, the water of the sea is from various causes not equally salt throughout; this also makes a difference in its weight, and, as before, may produce currents. Long continued winds are probably a very important cause of currents; a strong wind can push the water before it and heap it up. Smeaton found that a wind blowing along a canal four miles long made the water at one end stand four inches higher than at the other. When the wind ceases the water will of course flow back again. Other currents are produced by rivers flowing out to sea. For instance, the stream of the Amazon has been detected running three miles an hour, 300 miles away from its mouth.

These, and perhaps other causes, produce a constant circulation of water in the ocean. Probably there are but few places—deep pit-holes—where the water is absolutely still. Many of these currents must have considerable denuding force as well as transporting power. They run at intervals with not a little speed. The Race of Alderney goes at the rate of eight miles an hour; the effect on the surface of the water is so marked that the sailor who comes upon it in a fog at once knows whereabouts he is. The stream in the

*About the greatest known difference between high and low water is seventy feet, in the Bay of Fundy, Nova Scotia.

Pentland Firth, the Bristol Channel, and the Magellan Straits at times reaches a pace of fourteen miles an hour. The Gulf Stream, one of the best known and most important of ocean currents—a river of warm water which pours out of the Gulf of Mexico, and comes across the Atlantic, affecting more or less the climate of the coast of Britain*—runs at first from three to four miles an hour. All these, then, could do much more than sweep along coarse gravel. Still, it is probable that the denuding action of the sea does not extend to any great depth; in the most violent gales the sea is believed to be tranquil at a depth of from two to three hundred yards, so that these ocean rivers, like those on land, are comparatively superficial. Beneath them is only the gentler motion of the oceanic circulation, which, however, can still transport the finer materials, but has little or no abrading power.†

CHAPTER VI.

We have now to consider the modes in which water acts when it passes, or has passed, from the fluid to the solid state. Water, in becoming ice, occupies much more space, increases in bulk by about one-tenth. Ten cubic inches of water become about eleven cubic inches of ice; this change of bulk is very rapid, and the force exercised immensely powerful. Leaden pipes, as we often know to our cost, are ripped up as if they were so much paper; even iron bomb-shells, an inch thick, filled with water for the experiment, and securely closed, have been burst asunder. In climates colder than our own the ice-wedge is one of nature's most powerful carving tools. Water soaks into rocks, and then in freezing breaks them up. Quarrymen, in many cases, find the frost splits slates for them better than any of their tools. You may often see large pieces flaked off the stones in buildings, and in Canada even granite must be painted to keep out the water, otherwise it will be destroyed when the winter comes. The heaps of broken rocks that lie beneath precipices are, to a great extent, the chips from the ice-tool in Nature's workshop; and the jagged ridges and fantastic peaks about the summits of lofty mountains are mainly sculptured by this one force.

There is, however, another way in which ice acts more conspicuously, though far more locally, than as above; this is by what is called a glacier. A glacier is produced as follows: The water which has been pumped up into the sky as vapor, descends from it when the air is cold enough, not as rain, but as snow. Suppose, now, the climate of Wales were to become colder, then the snow which every year falls upon Snowdon would remain longer and longer each summer in sheltered places, just as it now does in the crevices on Ben Nevis. As the cold became more severe, the snow would lie deep at the heads of the glens, and be largely increased every spring by what slipped off the peaks when thaws came; the mass of snow thus accumulated would gradually be changed into coarse ice, partly by the water which trickles down, when the top melts in the sun, and is again frozen below, partly from the pressure of the upper layers on those below; for pressure alone converts snow into ice, as boys know practically, for they harden snowballs by squeezing them in their hands when they wish to take an especially vicious shot.

As this bed of frozen snow increases in size, it is at last no longer able to rest upon the sloping bed of the valley, but begins to move very slowly downwards. We can not now enter upon the precise cause of this motion—it is a difficult question, and one not yet quite settled. It is enough to say that the mass does not exactly slide, that is, it does not move more quickly as it descends; it rather "creeps" down hill. The pace is not rapid, rarely exceeding a foot in a day. The motion in many respects resembles that of a river, the middle part moves rather more quickly than the sides, the top than the bottom; this inequality of motion, and the changes of level in the bed of the valley, of course put a strain on the ice, under which it readily breaks, so that in many parts it is rent by chasms (called crevasses) again and again into a labyrinth of icy crags. In the course of its descent down a valley of variable shape, the mass is repeatedly squeezed together in passing through narrower parts, and thus rendered more and more solid. Two blocks of ice, as Faraday discovered, quickly freeze together, if the surfaces in contact are wet.

Like a river, the glacier acts both as a destroyer and as a remover of material. Its burdens, however, are, to a large extent borne on its surface, instead of being swept along the bottom. We will, therefore, consider this part of its work first. Fragments of rock are swept down in the snow-slips (called avalanches), or roll down the cliffs and slopes on the side of the valley; they fall on the edge of the ice-stream, and are slowly borne along by it; thus the glacier has always a ragged fringe of stone, like a selvage; this is called a *moraine*. When, as is often the case, two glens unite, the glaciers in each come together and form one stream; the moraines on the inner edge of each are joined, and form a single moraine, running like a track down the ice-stream. The sun, of course, melts the surface of a glacier, and as the stones of the moraine, when abundant, shelter the ice below, they gradually form an elevated ridge, consisting of blocks of all sizes, from as large as a cottage downward. Some of these are not unfrequently engulfed in passing over crevassed portions of the glacier, and isolated blocks becoming detached form what are called glacier-tables. At last the glacier yields to the sun's rays, is melted away, and drops its stony burdens in a confused heap at its foot. This pile is called a terminal moraine.

We have next to consider the effect of a glacier in wearing away the rocks. So large a mass of ice can not slide over the bed of a valley without to some extent wearing it away; and this abrading power is much increased by the stones which are engulfed, crushed and ground to powder between the ice and the rock below. The face of the underlying rock is thus worn away as by a great file, projections are broken off, rough places are smoothed. A peculiar curved, sometimes even polished surface, is thus produced; and the rocks over which a glacier has passed have a bossy rounded outline, which, from its resemblance to a sheep's back, has gained them the name of *Roches moutonnées*. Larger or harder fragments than usual, when frozen into the ice, scratch the smooth surface of the rock over which it passes, and these marks will indicate the direction in which the glacier has moved.

Furthermore, as a glacier can not quickly adapt itself to a change in the form of its bed, the face of a rocky step looking down the stream will often escape untouched; and thus, in cases of doubt, will indicate which way the ice was moving.

If then the climate become warmer and the ice has disappeared, we can still infer that a glacier has once existed, by—

(1) Moraines, lateral and terminal.

*How far the comparative mildness of the winters of the west coast of Britain and Norway is due to the Gulf Stream is still a matter of dispute.

†This, the gradual transference of vast bodies of water from cold to warm regions, and *vice versâ*, producing what has been well called the Oceanic circulation, is principally due to difference of temperature, and has been the subject of much careful investigation, during the last few years, by Dr. Carpenter and others in the Deep-Sea Dredgings.

(2) Isolated blocks, dropped during the retreat, which are often stranded on projecting rocks. These are called perched blocks (*Blocs Perchées*).

(3) Rounded, smoothed, or polished rocks.

(4) Scratches and grooves on the smoothed surfaces.

Now we may anticipate matters somewhat by stating that this has actually happened. There was a period, comparatively recent in geological history, when, at any rate in the Northern Hemisphere, the glaciers were far more numerous and greater than they now are. The glaciers of the Alps extended many miles beyond their present limits; for instance, the Rhone glacier has deposited blocks from the eastern end of the Mont Blanc chain upon the slopes of Jura, high above Neuchatel, and the lakes of Switzerland and Northern Italy have once been filled with ice. Scotland had glaciers reaching down to the sea. The English Lake District and Wales had large glaciers, perhaps even some of our lower hills. All about the above districts you may come upon the trail of glaciers, in many places as distinct as though they had but just melted away.

Here perhaps you may inquire, Water also smooths the surfaces which it wears away: how shall we know the difference? and again, How are we to know moraines from rubbish heaps fallen from cliffs, or deposits brought down by flooded streams, or distinguish true perched blocks from those that have rolled into the valley from some cliff high up on the mountain-side?

The following tests will help you to decide in cases of doubt:—

(1) Water "digs out" the rock much more than a glacier; water-marks are like this ⌣, glacier marks like this ⌢; the one makes "pot-holes," the other bosses.

(2) Moraines are generally ridge-shaped; the fragments of rock in them are usually sharp-edged or but little worn, and are not rounded into pebbles: thus differing from stream deposits; they often consist of materials quite different from the rock on which they lie; so that sometimes even a schist will be upon limestone. Had a stream brought them to their present place they would have been much more rounded; had they fallen from cliffs above they would correspond with the rock in these.

(3) The same test will help us to recognize true perched blocks. These also commonly lie in positions to which it is impossible they could have rolled, as on projecting bosses of rock far away from any cliffs, or on slopes where they could not have stopped if once set a rolling.

We have not, however, yet quite done with glaciers. When they come down into the sea, as in Greenland at the present time, large masses break off and (as ice is lighter than water) float away. These icebergs, as they are called, are sometimes from one to two miles round and full a thousand feet thick. Often huge pieces of rock are resting upon them, and so are carried about, till, as the ice melts, they drop to the bottom of the sea. Every year a fleet of icebergs sails from Baffin's Bay, freighted with specimens of Arctic rock, and drops its stony loads into the Atlantic Ocean.

Again, as these icebergs occasionally get aground, they may disturb and plough up soft mud, or even somewhat wear away hard rocks at the bottom of the sea. This effect however, is but local, and probably is not generally of great importance. Shore ice also (ice which has formed on the sea-shore), like a raft, carries off stones that have been frozen into it, and disturbs the position of others.

It is maintained by some scientific men of eminence that glaciers have great excavating power, and that the lakes in mountain regions—as for example the Alps—were to a large extent hollowed out by them.

In the present work I can do no more than mention this opinion, and state my own conviction, founded on many years' experience in mountain regions, that the excavating power of a glacier is comparatively small. To do more than this would require too much space, and the question is one rather for the advanced student.

CHAPTER VII.

These, then, are the several natural agencies by which from epoch to epoch, often silently and imperceptibly, the surface of the world is changed. Earth forces raise portions of the globe above into great wrinkles; the sea, like a huge plane, shaves away league after league of the land thus brought within its influence, paring down the projections, and tending to bring all to a uniform level. Thus, without the sun and the rain, the river and the glacier, we should only have the rolling swells of upraised land, or the level plains of marine denudation. These other forces, the river saw, the chisel of heat and frost, the ice wedge, the glacier file, fashion for us the varied outlines which give the earth so much of its beauty. Working away, "without haste, but without rest," they have carved out the peak and hewn out the precipice, have cleft the gorge and ploughed out the valley, have clothed the slope with soil, and spread abroad the fertile meadows.

As the earth is now being changed, as soil is now being taken from one place to be given to another, so has it been in past time. The various "formations" which we are presently about to describe are the ruins of others that have gone before, quarried and transported by the same forces which are still at work. As the rivers now bring down gravel, sand, and silt: as the breakers and ocean currents convey the same from every coast, so was it in past time; and as these are still being arranged in deltas of rivers and in depths of the sea, so were they formerly.

Before, however, proceeding to sketch very briefly the history of the earth and its inhabitants, it may be worth our while to call attention to one or two points with reference to the order in which these materials, brought by currents of river or sea, must necessarily be arranged. We described the manner in which a river swept along its materials, dropping its heavier burdens first. If, then, a stream or current enter some great sheet of water, and thus be obliged to flow less swiftly, it will of course drop first the pebbles, then the sand, then the clay. Beyond this last, the only rock that can be formed must be by the living rock-builders which will be described in the next chapter. Thus we may expect to find the deposits arranged, as we proceed from the river mouth, in the following order: conglomerate, sandstone, clays, and limestone. It is, therefore, important to notice that the mineral character of a stratum may change greatly as it is followed across several miles of country; that which was a conglomerate at one end becoming a limestone at the other. But this is not the only change. The coarser materials are deposited rapidly at once when the pace of the stream is diminished; hence the rock here will increase much faster than it will at the spot where comes but little sediment, and that very fine. A deposit under these circumstances will be wedge-shaped, since its top and bottom gradually come together, and thus may sometimes, when followed for a considerable distance, completely disappear. This is called thinning out, and is a matter often of great importance in Geology.

A few words may also be added on the preservation of fossils. But first you, perhaps, may ask: What are *fossils?* They are remains, or traces of remains, of plants or animals, which we find buried (Latin, *fossus*) in the crust of the earth. Thus not only are shells, bones, plants, etc., called fossils, but also the casts of these or the footprints of animals. Now, fossils are preserved in various ways. Sometimes they are

merely buried so as to be protected from any destructive action, as when shells are covered up in a clay through which water can not pass. Such shells, etc., are *preserved*, but they are in no way *petrified* or turned into stone; they remain as they originally were, carbonate of lime and animal matter, except that a good deal of the latter is always lost. Sometimes also they are enclosed in stone without being petrified. This is the case with fossils encrusted with tufa thrown down by the water, which are preserved just as are the birds' nests, etc., at petrifying springs. In other cases, however, the mineral condition of the fossil is changed, while its structure is preserved. Water, with some mineral dissolved in it, acts upon the fossil, penetrating into every cavity, so that, instead of being a crumbling shell, it becomes a solid stone, which breaks like a crystal of calcspar. In many cases this process seems to have been begun rather soon after death, as the most delicate parts of the fossil are preserved, as if they had been injected with the petrifying agent before they could even shrink up or show signs of decay. Sometimes, however, the water actually dissolves and removes the shell, but leaves in the hardened rock around an exact model of the form which has been there; and sometimes, while destroying the shell, it leaves for every atom removed another atom of some mineral which it has previously dissolved, so that a perfect model, correct to the minutest points, is constructed in a different material. Calcspar, silica, iron pyrites, and phosphate of lime, are the minerals which have generally produced petrifaction, the first two being much the commoner; and the latter of them especially given to this process of substitution.

The tracks of animals are, not unfrequently, well preserved, and are, as was said, ranked among fossils. Sometimes we are quite at a loss to conjecture what creature could have produced them; at others we can make a tolerable guess at its shape and habits. Closely allied to these fossils, though not exactly falling under our definition, are some marks in rocks which tell us what was taking place when they were deposited. If you walk now upon a sandy or muddy shore you will often see cracks where it has shrunk in drying, or flat, wave-like marks which have been made by the rippling water—ripple-marks, as they are called; and after a shower of rain, little pits formed by the falling rain on the soft surface. All these may be seen in rocks, even in some of the oldest; thus telling us that even in those far-off days the sun shone, the rain fell, the winds blew, the waters rippled, ebbed, and flowed, just as they do at the present time.

CHAPTER VIII.

We have already described the principal classes of rocks of which the earth's crust is composed. There is, however, one class, which is usually included with the Aqueous rocks, but is sufficiently interesting to require some separate notice. This contains the rocks which consist wholly, or almost wholly, of the remains of plants or animals, and thus, as composed of organisms, are often called the organically-formed rocks. The minerals of which they consist are carbon, silica, and carbonate of lime. Plants have given the first; animals have furnished much of the second, and almost all the third.

Carbonic acid gas is present in the air and water; plants, as it were, feed upon this—in chemical language decompose it, liberating the oxygen and retaining the carbon. Their remains under favorable circumstances accumulate, and thus a rock may be formed. This is now going on in peat-mosses. These are formed by vegetable growth: in the northern hemisphere by a moss called *sphagnum*, the upper part of which grows while the lower dies. They are confined to temperate and cold regions; none exist in the tropics, since, notwithstanding the luxuriant vegetable life there, the sun is too hot to allow of a growth of this kind. Of greater commercial value than peat is *coal*. (This, though now a hard rock, is under the microscope shown to be formed almost wholly of the remains of plants.) In Britain* it is very nearly confined to one geologic period; this, however, is not the case in other parts of the world. The seams of coal, varying from a few inches to a few feet in thickness, are interstratified with sandstone, shale, etc., commonly of fresh-water origin, and as they are always underlaid by a clay bed, and are, to a large extent at least, composed of plants which grew on the spot, they were probably somewhat similar to our peat-mosses, and are the remains of swamps about lagoons or in the deltas or estuaries of large rivers.

Persons regarding only the English coal measures have thought that they were formed when the earth was at a hothouse temperature, and the air unusually full of carbonic acid gas. The fact that great heat is now unfavorable to the formation of peat beds is opposed to one of these ideas, the remains of animals found in them to the other, and that they occur in various geologic periods to both. A temperature such as now prevails in New Zealand would probably be quite high enough. The different varieties of coal—Anthracite, Cannel, or Parrot coal, Caking Coal, etc., depend upon the amount of oxygen and hydrogen present with the carbon,† and these upon causes which have affected the beds since they were first formed. Into this part of the subject we must not now enter. The more modern coals are less valuable, and generally go by the name of Lignite or Brown coals.

Silica, we said above, is frequently present in plants, as in straw and the stems of the bamboo; and beds of rock of considerable thickness are sometimes wholly formed of the remains of exceedingly minute vegetables, called Diatomaceæ. These have a sort of framework or skeleton of silica, often most beautiful in structure, though so minute that several millions of them are contained in a cubic inch of rock. This is called Tripoli, and is worked as a polishing stone.

A more familiar organic silicious rock is flint or chert: these being essentially the same rock, but the former the purer variety. It occurs in nodules and layers in limestone. Now, many sponges and other organisms belonging to the animal kingdom have a flinty framework. None of them belong to the more highly organized part of it, yet, for all this, they are often exquisitely beautiful. The lovely Venus' flower-basket,‡ which resembles a cornucopia of spun-glass is the framework of a silicious sponge, and many other sponges are full of minute flinty spines of various forms. Flints, the formation of which was so long a puzzle, are no doubt in some way or other produced from the materials supplied by sponges, aided by these other organisms, animal and vegetable.

Dissolved carbonate of lime is carried, as we said before, into the sea. The amount of carbonic acid present in the water is more than sufficient to prevent this mineral

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* At Brora in Sutherland there is a fairly good coal field belonging to a much later epoch than those of England. Lignite, of comparatively recent geologic age, is obtained at Bovey Tracey (Devonshire).

† The following table gives the percentages of carbon, hydrogen, oxygen and ash (chiefly the earthy matter in the coal), of some of the varieties of English coal:

	C.	H.	O.	ASH.
S. Wales Anthracite	92.56	3.33	2.53	1.58
Wigan Cannel	84.07	5.71	7.82	2.40
Northumberland (caking)	78.65	4.65	14.21	2.43*a*
S. Staffordshire (non-caking)	76.40	4.62	17.43	1.55*a*
Bovey Lignite	66.31	5.63	22.86	2.36*b*

(*a*) Sulphur 0.55. (*b*) Sulphur 2.36; Nitrogen 0.57.

‡ *Euplectella speciosa.*

from being deposited, as sometimes takes place with what are called petrifying springs, and it is separated from the sea by animals. Here, also, the principal rock-formers appear to be the less highly organized; for beds, composed largely of what are popularly known as "shells," are rare.

One great rock builder is the coral animal—a near relation of the "sea anemones" common on our coasts. There are corals in all seas, but the reef-builders are found only where the water is warm, clear, and not deep. The coral reefs are distinguished according to the mode of their occurrence into fringing reefs, barrier reefs, and atolls. If corals establish themselves upon the shelving shore of an island, they will gradually grow upward to, or very near, the surface from all depths less than twenty-five fathoms. Thus what is called a fringing reef will be gradually formed about the coast, the breadth of which, of course, to a considerable extent depends upon the slope of the shore. Suppose, now, the island sink very gently downward, the coral will continue to grow upward, layer forming upon layer; but as the water near shore may be less pure and thus less favorable to coral growth, a channel between the highest part of the reef and the coast will gradually be produced, and so the fringing reef in time become a barrier reef. If the fringing reef be formed about a small, regular-shaped island, then, as the ground sinks, a ring-like barrier reef will be formed, and when the island has wholly disappeared, this reef—a ring of coral enclosing a lagoon of salt water—is called an atoll.

To give some idea of the importance of the coral as a rock-producer, it will be enough to mention that reefs and atolls abound in the Pacific and parts of the West and East Indian Seas; and that the Barrier reef off the north-east coast of Australia is about a thousand miles long, and at an average distance from shore of from twenty to thirty miles; the depth of this channel varying from ten to sixty fathoms, while the soundings just outside the reef are sometimes more than 300 fathoms. What a huge rocky wedge this would be if we could see it upraised above the water, covering, as it does, an area not much less than that of Ireland!

But there is another rock-builder, far less conspicuous, though at least as important. Quite at the bottom of the series of living creatures that make up the animal kingdom, are what are called the Foraminifera: we can give them no simpler name, because they are too small to be generally noticed. They are mere specks of brownish jelly, extending itself into some irregular threads. Yet this living jelly —"sans eyes, sans teeth, sans everything"—forms a tiny house or "shell" of carbonate of lime, of the most wonderful beauty. Many of these are like minute copies of spiral shells, so that older naturalists classed some with the nautilus, from which they were at least as far removed as that is from a monkey. Delicate as their coverings are, we can detect them by thousands in many limestone rocks. Chalk is made of them and of fragments of coral, shells, etc. I have a number of microscope slides before me which show that a very large portion of it is simply "dust that was once alive."

Much light has been thrown on the formation of flint and chalk by the recent Deep Sea Dredgings; and Dr. Carpenter tells us that in many parts of the Atlantic, down in the depths, a mud is forming, consisting almost wholly of Foraminifera. This, when dried, is very like chalk; some, indeed, of the Foraminifera can hardly be distinguished from those which occur in that formation; with these he dredged up many silicious sponges, so that probably at the present moment chalk and flint are being formed in the deep sea that lies between us and America.

In concluding this part of our subject, it may be well to pass in review very briefly the results of the previous chapters, so far as they concern the formation of rocks. We can hardly doubt that the first-formed rocks were igneous, even if they did not resemble any that can now be formed; and that from the ruins of these, or of later igneous rocks, all other rocks must either directly or indirectly have been built up;—directly by the fragments broken off by the natural forces which have been described in Chapters III. to VI., or indirectly by the remains of living creatures which have possessed themselves of minerals derived, at some time or other, from igneous rocks, as explained in Chapter IV. Thus we might classify the various rocks which now compose the earth's crust under three heads: *Igneous*, those which have cooled down from a melted state; *Aqueous*, those which have been deposited under water; *Aerial*, those which have accumulated in open air. Of these, the materials of the second and third have been in some way or other derived from the first; and the last (which is much the smallest), includes such deposits as hills of blown sand and heaps of stone fallen at the feet of precipices.

Again, we might regard rocks from another point of view and classify them as *chemical*, *mechanical*, and *organic*. The first would include all those rocks formed solely by chemical action, whether by cooling down from a molten state, like Igneous rocks, or thrown down—precipitated—from water in which they have been dissolved, as happens with some *fresh-water* limestones. The second would include all rocks formed by the forces of nature from previously existing rocks; and the third, all which had been formed by the agency of living creatures from minerals in a state of solution.

Further, whichever way we classify the rocks, we must remember that every one of them may be altered after it has been formed, so that each class has its corresponding *metamorphic* rock; though, in this case, very often it may be difficult, if not impossible, to distinguish the one from the other. This subject, however, is too difficult to be pursued further at present; only remember that all rocks, however formed at first, may be much altered afterwards, and that the principal agents in this alteration are heat, pressure, and water.

CHAPTER IX.

We have now arrived at the third great division of our subject, the life history of the earth. Hitherto we have only investigated the nature of its materials, and the forces which have given them shape, without regard to their relative age, or to what they can tell us of past events. The rocks have already shown us that the earth has long been tenanted by living creatures. They must now be asked what these were like, in what order they came, how far they differed from, and how far resembled, those which now exist. As in the first part of our subject some knowledge of chemistry and mineralogy was indispensable to any real progress, so the student of this must have at least some acquaintance with the elements of zoölogy.

Fossils are the hieroglyphics, graven on the rock, which, when deciphered, reveal to us the earth's history. Hence, if they are to be more than mere "curiosities," we must know enough of living creatures and their structures to understand what they are and what they mean. The science which investigates the nature of fossils is called Palæontology (*palaios* old, *onta* beings). It is a branch of zoölogy and comparative anatomy which concerns itself rather with the extinct than with the surviving. Let me therefore advise you as soon as possible to buy some text-book of zoölogy, and, though it will cost you a little trouble to master its contents, especially if you cannot get ready access to a museum, you will be well repaid in the end.

I can not attempt to give you any clear idea of the life history of the earth—the subject of the concluding chapters

—without sketching out broadly the principal divisions of the Animal Kingdom. Perhaps the same should be done for the Vegetable; but as Plant remains are much rarer than Animal, and are much more difficult to classify owing to their less perfect preservation, we may venture to leave this part of the subject for the more advanced student.

It is found that animals differ in the possession of parts more or less specialized—namely, which are used for one or more particular purposes—and that these are arranged upon a few definite plans. All known animals are constructed upon six types or plans of structure, which are called Sub-kingdoms. These are—

Protozoa,	Annulosa,
Cœlenterata,	Mollusca,
Annuloida,	Vertebrata.

These sub-kingdoms are further divided into classes, which are again subdivided into families, genera, and species.

The *Protozoa* are very simple in structure, little more than animated jellies, with hardly any approach to definite organs, and yet building up frameworks of exquisite beauty. To them belong the Sponges, the only familiar members of this sub-kingdom,* the Foraminifera, and the Polycystinæ; most of these last two are minute; they construct "shells" of great beauty, the former usually of carbonate of lime, the latter of silica. The name Protozoön is derived from two Greek words, *protos*, first, *zoön*, animal, because this is the first sub-kingdom in the rising scale of life.

The *Cœlenterata* have a few special organs; they might be described as little more than living stomachs. To them belong the corals, the so-called sea-anemones, jelly-fishes, and many of what are called corallines. The corals are abundant in a fossil state, but all the other members of this sub-kingdom are either missing or comparatively rare. The name is derived from the Greek words, *cœlos*, hollow, *entera*, the inner parts.

Annuloida.—This sub-kingdom was formed to include a number of animals which have a somewhat ring-like or circular arrangement, and are in other respects intermediate between the Cœlenterata, which are often one ring, and the Annulosa, which are a series of rings. To it belong the sea-urchins, star-fishes, sea-lilies, and other kindred animals which make up the class *Echinodermata* (*hedgehog-hide*, from the often prickly exterior); this is abundantly represented in a fossil state, and some of its subdivisions are only so found. The word is a barbarous compound from the Latin *annulus*, a ring, and Greek, *eidos*, form.

Annulosa.—This consists of animals whose bodies are a series of rings, as, for example, an earth-worm or a centipede. Of its classes the most abundant in a fossil state is the Crustacea, to which belong the crabs, lobsters, barnacles, wood-lice, and other less familiar forms. The *Arachnida* contains the spiders; *Myriapoda*, the centipedes; *Insecta*, flies, moths, bugs, beetles, etc. None of these, however, are very numerously represented in a fossil state. The name is derived from *annulus*, a ring.

Mollusca.—This consists of animals whose bodies are usually soft (*mollis*) though often contained in a hard case. All of what are properly called "shells" belong to this sub-kingdom, and some "corallines." Four classes of shells are abundantly represented in a fossil state; these are the *Brachiopoda*, the *Lamellibranchiata*, the *Gasteropoda*, and the *Cephalopoda*. The first of these important classes contains among others those bivalves which are popularly called lampshells. They are seldom or never picked up on the British shores, and are not numerous in British seas. They are usually not large or strong shells; the valves are not of equal size but are symmetrical in shape, that is, one half corresponds with the other half. The name means *Arm-foot*, and is given by reason of some curious coiled-up arms within the shell, which were once supposed to be feet; they are, however, in reality breathing organs.

The *Lamellibranchiata* are also bivalve, but are often much larger and stronger shells than the Brachiopoda now are. These valves are usually of equal size, but are not symmetrical. The cockle, mussel, the scallop, and the oyster will serve as examples; the last two are rather exceptional, as their shells are often nearly symmetrical and not equivalved. The word means *Plate-gills* from the form of the breathing organs.

Gasteropoda.—With one exception all the members of this class have univalve shells; that is, inhabit a shell which is more or less a cone or tube in shape—limpets, whelks, periwinkles, snails are all Gasteropods. The name signifies *belly-foot*, because the underside of the body forms a kind of foot on which the animal creeps.

Cephalopoda.—In this, the most highly-organized class of the Mollusca, the organs of locomotion are arranged about the head, whence the name, head-foot. Some of them have external shells, as the nautilus, and these are usually chambered, *i. e.*, divided by partitions, with a communication from one to the other. Others, however, as the cuttle fish, have an internal shell, or "pen," as from its shape it is sometimes called.

The last sub-kingdom is the *Vertebrata*, including all animals possessed of a backbone (or *vertebra*). The classes of this are: (1) Fishes (*Pisces*); (2) Frogs (*Batrachia*); (3) Reptiles (*Reptilia*); (4) Birds (*Aves*); (5) Mammals (*Mammalia*). Of these examples are hardly needed. All are represented in a fossil state, the remains of the birds being the least frequent.

Now, when we attempt to arrange the stratified rocks in chronological order, that is, in a series commencing with the earliest deposited and ending with the latest, we are principally aided by two things: (1) the position of the rocks; and (2) their fossil contents. If we find one statum above another, it is obvious that (unless in those rare instances where we have reason to suspect an "overthrow") the upper stratum is the newer. Sometimes, as in many parts of England, we can travel for considerable distances, and come to stratum after stratum, each either cropping out from beneath the last, or, if we are going in the opposite direction, distinctly overlying it. Mines and borings, quarries, or sections made by streams, show us the correctness of the apparent succession, and thus we are able to arrange a series in order of time, placing the oldest at the bottom, the newest at the top.

But now, supposing we have to cross a country so covered with vegetation that we can not see what is below the surface, or, what is more difficult, a mountain chain or a sea, how are we to compare strata several miles apart, and fit them in their places in the series? The mineral character of the rock will help us sometimes. As the chalk near Calais closely resembles that at Dover, it is reasonable to suppose, even without further examination, that these belong to the same deposit. But with rocks wide apart we can not do this. Sandstone, clay, limestone, etc., must have been forming in different places at all periods of the world's history, so we can not be sure either that rocks in Britain and (suppose) in Bavaria are of the same age when alike, or of different when unlike one another. I have seen a piece of mud dredged up from the deep Atlantic that could not have been distinguished from Cambridgeshire chalk-marl, and yellow limestones in the Alps belonging to the same age as blue clays of England.

In this difficulty Palæontology helps us. The fossils are made to tell us what creatures lived upon the globe (usually in the sea) when the beds were deposited; and if we find

*Some naturalists are now in favor of promoting sponges to the next sub-kingdom.

that the fossils correspond, we then consider them to belong to the same age. Even when there is not a very close correspondence we can to some extent infer the relative ages of the beds. For example, suppose we had three beds, widely separated by older rocks, with no fossils common to any two, we can still get some idea of their age. Examination of the beds that we have been able to classify elsewhere, shows us that there has been a progress in the forms of life; that, in earlier times, the more perfectly organized animals were either absent or poorly represented; and that those of lower type were more abundant and flourishing. Just as the white man has pushed out the red Indian, so the higher races seem to have taken the places in the world once occupied by the lower; this is true to some extent of the sub-kingdoms, but it seems to be also true of classes in them, and especially of such classes as have any special work to do. The class which first appears is the one lowest down in the scale, and it too begins with its least highly organized members. These laws which regulate the distribution of life in time and space have been concisely expressed by Prof. Huxley, in the following words: "Palæontology has established two laws of inestimable importance; the first, that one and the same area of the earth's surface has been successfully occupied by very different kinds of living beings; the second, that the order of succession established in one locality holds good, approximately, in all."* We therefore look to see with what period in the known scale of the fossils our unknown deposits correspond, and refer them to this.

Still, each of the above methods requires much caution in its use. In many cases there is no doubt that the upper stratum is the newer; there may be some where this conclusion would be wrong. There exists, however, a greater difficulty in the comparison of fossils. We know that the plants and animals of parts of the world widely distant, especially of those with different climates, are very dissimilar. As we believe that climates in former times were unlike just as now, the faunas and floras must have been unlike; hence great similarity in these at places on very different circles of latitude would rather imply that the deposits belonged to different ages, because the climate must have changed, so that the animals and plants which had lived in the one place had been obliged in consequence to migrate to a more congenial region in the other. This, of course, would have required time.

So we must remember that where places are rather widely separated, we can only arrange their strata in this manner very roughly; and that correspondence in fossils then rather implies some difference in date—although, speaking broadly, they may still be said to belong to the same great period of the world's history.

It must also be remembered in all arguments founded on fossils, how very imperfect our knowledge at present is. A great part of the earth's surface has not been examined at all—as in Central Africa; and in the best known parts we only see a small part of what is underground. We are very much in the position of persons called upon to describe the cloth in a warehouse, in which they are only allowed to finger the edge of a few bales. We can reason upon what we *do* find, but must be very cautious in forming theories about what we do not find.

Bearing these points in mind, we see that it is impossible to recover a complete history of life on the earth. In the great stone book of Nature, pages here, sheets, and even whole sections there, are wanting, and cannot be recovered. In forming a table of Geological Periods, we are doing our best to bind into volumes the fragments which we possess. At first the gaps were so marked that geologists thought that on several occasions the earth, or a large portion of it, had been swept clear of all its inhabitants, and then had been again peopled with a new created set of living creatures. To some extent we have been able to fill up the gaps, enough to show us that there could have been no such general and universal destruction, but that species gradually died out and others replaced them. In speaking of geological periods and formations, we must now only be understood to mean that the limits of these mark gaps in our knowledge; missing pages, or sheets, or parts, to return to the former simile.

We have therefore, for Britain, the following arrangement:

First three great periods, the division between each corresponding with a great break in the British record, the first, second, and third volumes of our history.

(1) Primary,* or Palæozoic.
(2) Secondary, or Mesozoic.
(3) Tertiary, or Kainozoic.

These have been subdivided as follows;

Laurentian, Cambrian, Silurian, Devonian, Carboniferous, Permian,	Palæozoic.
Triassic, Jurassic, Cretaceous,	Mesozoic.
Eocene, Miocene, Pliocene, Pleistocene,	Kainozoic.

Each one of these is again subdivided (as chapters are into sections); each subdivision corresponding with some marked change in the character and contents of the deposit.

In this succession there are many gaps. The two most conspicuous in Britain have been used for drawing the lines before and after the Mesozoic or Secondary Period. These great gaps are to some extent filled up by formations in the neighboring parts of Europe; but so far as Britain goes, not only is there a great gap, but also the last chapter (Permian) in vol. i., and the first (Triassic) in vol. ii., are in a most tattered condition; and the interval between the Cretaceous and the Eocene is very great.

Before leaving this part of the subject, I must explain rather more clearly upon what evidence the existence of one of these gaps or breaks may be inferred, even where there happen to be no fossils to guide us. In fact, a considerable change in the fossils does not always imply that a long time has elapsed.

Suppose there is a limestone (with fossils), being deposited in a tolerably clear sea. Some change, not necessarily a very great one, may bring a current over here charged with river mud: most of the former inhabitants of the sea must migrate or die, and will in time be replaced by those that live in muddy water, so that we may have a complete change in the stratum, and a great change in the life; yet no long interval of time has elapsed, and there is no real gap in the history. Accordingly a change of this kind may, or may not, correspond with an unrecorded interval of time. As a rule, indeed, marked changes in strata and life-forms do so correspond, but the rule has its exceptions.

One change, however, in strata can only indicate a lapse of time; this is denoted by the term *unconformability*.

When two strata lie quite evenly one on the other, both

*Address to Geol. Soc., 1872; "Lay Sermons," p. 225.

* The word Primary has rather gone out of use, as it had become entangled with some erroneous theories about the age of non-fossiliferous rocks. Secondary and Tertiary are still largely employed. Palæozoic, Mesozoic, and Kainozoic are from Greek words, and mean Ancient (period) life, Middle (period) life, and New (period) life respectively.

horizontal, or both dipping in the same way, they are said to be *conformable*. When the base of the upper rests upon the irregular surface of the lower, or, what is more conspicuous, when the two strata are not parallel to each other, they are said to be *unconformable*.

When the upper beds of a conformable series of strata cover up in succession the lower, they are said to overlap them; this, of course, implies that the ground was gradually sinking, and the sea in that region gaining upon the land.

A portion of a deposit separated by denudation from the main mass is called an outlier, and one included in a series of older deposits, like a pudding in a basin, is called an inlier. Those formed in lakes and inland seas are of course inliers.

[*End of Required Reading for November.*]

SHE WAS A PHANTOM.

She was a Phantom of delight
When first she gleamed upon my sight;
A lovely Apparition, sent
To be a moment's ornament;
Her eyes as stars of Twilight fair,
Like Twilight's, too, her dusky hair;
But all things else about her drawn
From May-time and the cheerful Dawn;
A dancing Shape, an Image gay,
To haunt, to startle and way-lay.

I saw her upon nearer view,
A Spirit, yet a Woman too!
Her household motions light and free,
And steps of virgin-liberty;
A countenance in which did meet
Sweet records, promises as sweet;
A Creature not too bright or good
For human nature's daily food;
For transient sorrows, simple wiles,
Praise, blame, love, kisses, tears and smiles.

And now I see with eye serene
The very pulse of the machine;
A Being breathing thoughtful breath,
A traveler between life and death;
The reason firm, the temperate will,
Endurance, foresight, strength, and skill;
A perfect Woman, nobly planned,
To warm, to comfort, and command;
And yet a Spirit still, and bright
With something of angelic light.

PARENTAL RECOLLECTIONS.

A child's a plaything for an hour;
Its pretty tricks we try
For that or for a longer space;
Then tire, and lay it by.

But I knew one that to itself
All seasons could control;
That would have mocked the sense of pain
Out of a grieved soul.

Thou straggler into loving arms,
Young climber up of knees,
When I forget thy thousand ways
Then life and all shall cease.

THE CHRISTIAN CITIZEN.*

Words are such stubborn things that one can never be entirely certain that those whom he addresses will apprehend them in the same sense that he intends them to be received. This fact must be my excuse for defining words so frequently used, and apparently so well understood, before an audience of such intelligence as this.

The term "citizen," as it will be used by me to-day, is purely an American word. It may seem a strange declaration to make that a term which is as old as the *civitas*, Roman itself in its radical significance, yet in its most generally accepted significance to-day is clearly a product of our American civilization. "Citizen," as defining some sort of relation between the individual or class, and the state or a city, is a word too old to talk about its origin; but, as meaning the relation of the American citizen to the American nation, or as meaning the relation of an individual who is a component part of a self-governing community, it is just as old as the American nation, and no older. We are accustomed to talk loosely about the republics of Rome and Greece as ancient self-governing communities. Whenever we use the word "republic," whenever we speak of self-government in connection with the people of any nation existing previous to the birth of the American Republic, we utter a falsehood; we speak of what does not exist and never did exist. I wish to call attention to this because of the analogies that are so often sought to be drawn between those so-called republics and the real self-governing communities of to-day. Greece and Rome in their best estate were simply aristocracies, or, perhaps more properly, plutocracies. They were oligarchies who chose temporary rulers. The present idea of a self-governing community—that which now exists throughout the civilized world—is not that of a people who chose men to rule over them, but of men who are chosen to be the agents of a people in their own self-government. [Applause.] So that I shall define "citizen," for our use to-day, to be one of the co-ordinate elements of a self-governing community.

Now, I must attempt the more difficult task of defining the word "Christian." I doubt not it seems as simple a thing to the merest child here present as falling off a log to a turtle, but there could not be a greater mistake. The term "Christian," if made too broad, embraces many a man that has no business under its ægis; if made too narrow it shuts out many a man whom I would reach with my thought to-day. I doubt not the definition which I shall adopt will meet the criticism of many, especially of our ministerial brethren who are present. They must remember that in dealing with this term they are thinking chiefly of the world to come. Citizenship, however, happens to be bound by the river of time; Christianity as it affects citizenship stops at the hither side of the Charonic ferry. I propose to regard "Christian," then, as including every man who believes in the teachings of Jesus of Nazareth, or who, not believing in them, is imbued with his spirit, or thinks he ought to be. Why do I make it so broad? Because I propose only to consider it in connection with citizenship; not the rights or privileges of the citizen at all, but simply his duties and the relation of Christianity to the performance or non-performance of those duties. In this connection, I do not mean, be it understood, by the term Christian, or Christianity, to refer at all to the Church. I do not mean any inchoate or indefinite, or any defined and organized body of men having boundaries and elements different and distinct from those of the State. I do not mean to consider the relations of the Church, as an organization,

*A lecture delivered in the Amphitheater, at Chautauqua, August 11, 1881.

to the State or the nation; I shall have no reference to the Church at all, but I intend simply to consider the individual relations of the citizen to the State as affected by Christianity. In other words, I desire to suggest for your thought what is the injunction of Christianity to the individual Christian as regards his personal duties as a self-directing integer of a self-governing community. A republic, a self-governing community, casts an equal burden upon your shoulders and upon mine. It is no unreal figure of speech that refers to the citizen of our republic as an uncrowned king. Not only does sovereignty come back to him in its last resort, but the attribute of power and government rests constantly upon him. Every one of the fifty millions that compose our nation, who has attained to man's estate, has upon himself the responsibility of good government or of bad government for the whole. It is a responsibility that he can no more shirk or surrender than he can shirk the responsibility of his own soul's salvation upon another. There are no deserters or bounty-jumpers in the army of freedom any more than in the army of the Lord. [Applause.] The man who seeks by any means to avoid any portion of this responsibility brands himself by that very act not only as a moral sneak but as a thief, who "takes that which him enriches not, and leaves me poor indeed." It is not my good name which he has stolen, but it is my right to good government. Between you and me there is an unwritten contract. We never looked into each other's faces before; we never heard each other's voices until this hour; but as an American citizen you are bound to me by the fact of my American citizenship to do all in your power without injury to yourself, to give me every right, privilege, immunity and blessing that good government can bring. [Applause.]

Now, what is the relation of Christianity to this duty? That is the question that I shall call upon you to answer. The great characteristic of the Christian religion is that it is a *doing* religion. There is not an atom of slothfulness in it. The dreamy creeds of the drowsy east implanted in man's heart the anchoritic idea that by exclusion from the world, by contemplation simply of God, he might sneak out of his responsibility to his fellows, and climb up the Jacobian ladder into heaven without leave [laughter and applause], without having done anything to entitle him to its blessings or enjoyments. The Christian religion has no passive voice. It is an active, transitive idea—it always means something—and the Christian is shot out into the world like a bomb from a mortar to hit somebody, and hurt somebody. If he does not do it, it is not the fault of the powder that lay behind him—the spirit of the unresting Good-doer, Jesus of Nazareth—it is the fault of the so-called Christian himself. It is because he has not weight enough, and strength enough, and consistency enough to hurt anything when he comes against it. [Laughter.] I say this is the great distinctive idea of Christianity, and if any learned man who listens to me will glance his eye over the history of religions, he will find that there never, previous to the day of Jesus of Nazareth, was a religion proclaimed that had a human side. A man under those ancient creeds, under any other system of philosophy, if saved at all, was saved for his own sake. He simply by a sort of special favor was allowed to tack himself to some so-called divine influence, and share its apotheosis. The thought and spirit of Christianity is radically different from this. Look at those three wonderful years of its Great Master's ministry, as it is called—service would have been a better name—what did he do? Did he spend his time in prayer? You may write down upon your open palm in big letters all the prayers of his that are recorded. Did he establish forms and ceremonies? He left the question of church organization so indistinct that sects to-day are founded on a question of Greek inflection. [Laughter.] Did he spend his time in retailing to his followers the glories of paradise like Mohamet? You may write almost upon a thumb-nail all that he has said to us about the world that is to come. He lived in the present, and that glorious record is filled to overflowing with one fact—*he went up and down the world doing good to all men.* [Applause.] It is this which makes Christianity the mother and nurse of the republican idea. [Applause.] The declaration of the great underlying tenets of democracy came from the Master's lips; were echoed next by grand old Peter when he had seen the vision of Joppa, and rushed hissing-hot from the mouth of Paul when he stood amid the seething masses of Roman life and said, that in Christ—that is, in the Christian idea, the Christian world, the Christian nation—there was "neither Greek nor Jew, barbarian, Scythian, bond nor free." [Applause.] For the first time, the right of man to coequality with his fellow man, and the correlative duty that rests on him, because he is a man, was declared by the founder of Christianity. I am afraid some learned man may take issue with me there. I had the folly to make that statement a few months ago, and a man said in derision, the next day, that the idea of Christian religion—"Do unto others as you would that they should do unto you"—had fallen from the lips of Confucius centuries before the birth of Christ. My dear friends, there is all the difference between the Confucian doctrine and that of the Nazarene that there is between holiness and trade. [Applause.] Confucius said to his pupils: "If you want to succeed in this world treat everybody that you meet well; serve others as you would like to be served, *because* you may need to have your own back rubbed some day." [Laughter.] That was the doctrine of Confucius. The doctrine of Jesus Christ is: "Do unto all men as you would that they should do unto you, because they are men with you, and my children." [Applause.]

Now, what are the relations between this fundamental idea of Christianity, its characteristic essence, and the duty which you and I owe to ourselves, our neighbors, and our children as citizens of this great republic? That is the question which I wish you to consider for a little while. There are some sects—thank God they are tolerably insignificant—like the Dunkards, and the Moravians, and the Mennonites, and other odd people scattered up and down through the Christian world who refuse to take up this duty of self-government which God lays upon us. They sit down and fold their hands and twiddle their fingers, and leave the Lord and the Devil to fight that matter out alone, accepting the result without grumbling, no matter which comes out on top. [Laughter.] Our friends the Quakers sometimes announce a similar doctrine, and occasionally they try to practice it; but they always take a hand in when they see that the Lord can not well get along without them. [Laughter.] It is not to those sects, nor to any particular parts of the Christian Church that I desire to refer to-day; but it is to that spirit which prevails to a considerable extent in nearly all denominations, that the nearer a Christian would get to God the further he must keep away from politics. Now, in my view, politics—the good government of a great people—is the big human end of religion. [Applause.] On us reposes the responsibility of the future character of our government and our people. A nation is not merely good by accident, or good training of its individual members, but it is made good and kept good by the force of good law and good administration. It is good by the force of those who govern, and by the principles that control and dominate their action. I presume there is not one in this assembly who has ever uttered that expression which is so frequently heard in the world outside of Chautauqua, to this effect—generally spoken with a good deal of self-com-

placency, too: "Well, sir, I mean to do my duty; I go and vote always; but I take no personal interest in politics; I think too much of myself to do that; I don't propose to risk my religious character by going into the struggles of a campaign." My notion is, my friends, that a man whose religion will not stand the jostle and wear and tear of political life has not enough of it to be worth saving. [Applause.] Not only is the Christian religion an active religion, and an active idea, but, thank God, it is not a bandbox idea. It is not one of those precious gifts which must be folded up and wrapped and tied and locked away for fear the Devil will put his contaminating clutch upon it. It is its great glory that it is an every-day garment; and the particular beauty of the material is that the more it is worn, and the dirtier the places where it is worn, the better it looks and the better it is. [Applause.] It is an adamantine shield that courts the conflict, because every blow of battle-axe, every thrust of spear, or impinging of the arrow but removes the grime and shows its brightness. [Applause.] If we are charged with a duty toward our fellows we must do it if we are Christians, or if we mean to be Christians.

Ah, I suppose the cry comes up in the hearts of a great majority of you: "Politics is such a dirty mess! Would you have a Christian man go down into its filth? Would you have a man take his good name into the political arena, with its fraud, and corruption, and rings, and bosses, and the Lord knows what of iniquity? What chance has a good man or an honest man in that seething maelstrom of infamy?" My friends, I do not mean to admit your premises. I am not one of those who believe that the political life of our nation is worse than that of other nations, or that our political life of to-day is worse than that of other days. [Applause.] I believe that there never was an hour when the political ethics of our people were as high; when the moral character of our political leaders of all parties were as pure as they are to-day. [Applause.] We have, unfortunately—no, fortunately, let me say—among us a class of good men and women who believe that the highest duty of the Christian citizen is to praise God and find fault! [Laughter.] The latter part of it they do with zeal. [Laughter.] The first I hope they do equally well. But when those people utter anathemas in regard to the political thought and life of to-day they forget one thing. They do not pause to consider the fact that if we could turn this flood of light which this reporter's table typifies upon the lives of even the last generation of our public men, they would turn away with blushes of shame and disgust. Suppose that a really truthful life of any one of the thousand of names we revere in the political world of a generation or two could be written, and that types could be found to print it? Is there a man or woman here who would let it lie upon the centre-table, or put it in the hands of a son, much less a daughter? There is a wide difference in the light that is focused upon the lives of yesterday and to-day. At night the moon is always bright in comparison with the earth, because we see the bright side of it. So we always see the bright side of the past that is distant from us, and the dark side of the present that is under our feet. Why, only a score of years or so ago, a tale of shame or infamy died of old age before it got across the borders of a single State. Now, three continents read of to-day's misdeeds at to-morrow's breakfast table. The blood on the murderer's knife has not time to dry before Europe hears the cry. And before the officer of the law can move a block to lay his hand upon the criminal Asia knows of his offence. Your day is a wonderful day. Your standard of man is a wonderful standard, and your fault-finding is largely the result of the fact that you see the standard of to-day, and the men of to-day, and forget that those of yesterday were measured by another.

But, granting all that the most lugubrious complainer could wish, or as Byron says, granting that everybody and everything in politics is "as bad as the Devil could wish," whose fault is it? Whose fault is it? I do not ask this for the purpose of blaming you, my friends. I would not presume it to be your fault, but let me tell you if there has ever been misgovernment in America; if there has ever been wrong or oppression in America; if there is now iniquity in high places, or in low, it is because the Christians in America have not done their duty. [Applause.] You can not do your duty to the state by simply praying for it, paying your taxes, and voting once a year. You can not pray political evil out of existence, nor political good into existence. You have to work, and word hard, to accomplish such a result. The work must be done if the good is to be achieved, and because you are the governors, the equal and co-ordinate kings of the land, it is laid on your shoulders to do it.

Another thing, you can not cure a political evil by finding fault with it. You might just as well undertake to batter down Gibralter with green peas. I have sometimes thought that the Christian citizens of the United States read Josh Billings. You remember the description that laughing Solomon of our day and land gives for milking a kicking cow: "Stand off about twenty feet and holler 'So! blast you!'" [Applause and laughter.] It is not an infrequent thing to find a man of exalted piety who wants the political world to go just right. He wants everybody to have all his rights and privileges and immunities guaranteed and secured to him, but he considers himself as having performed his duty when he stands off and says: "So! blast you!" Somebody else is not doing right; somebody else is neglecting what ought to be done. Fellow citizens, this is an excellent exercise for certain powers of the body and mind. My Christian friends, it is a good way to advertise your religion when it begins to run low, but when you come to sum up the results achieved for others they are not worth considering.

"Well, what will you have us do? Do you mean to say," comes the inquiry, "that it is my duty to leave my farm, and my store, and my oxen, and my newly married wife, and go out and take part in every political campaign?" Well, now, that depends entirely on how much you have at stake. The Lord by his providence has laid this duty on you, and the question is whether you can afford to shirk it, that is all. The question is whether you can afford to have the ills of fifty millions of people laid at your door, or the sufferings and sins of their children and their children's children heaped upon your soul in the day of judgment. If you can, stay at home and scold at politicians and shun politics. [Applause.]

The problem of self-government, as I have before intimated, is a new one. It came to our American people along with a new continent that was rich and bountiful and free,—a continent that asked for the touch of the hoe, and gave for the rippling of its soil golden measures at the harvest time. It came to us in connection with a new life—the life of man living for himself and through himself without the dictation or control of any other, and with it came also this correlated duty to our fellows, requiring every man to do his part as a co-ordinate king in the government of this fair land. This duty has been neglected, sadly neglected. I do not blame the fathers, because it is useless to do so; I do not blame the present, because it began before we were; but I do blame that man of to-day, who, seeing the evils that have resulted from neglect, simply stands up and scolds about them instead of taking off his coat and working to cure them. [Applause.] But you say, "I vote." Oh! yes, you throw a paper-wad at what you do not like, and think that by so doing you are performing your whole duty? No, you do not—not one of you thinks so. The man who

buttons the cloak of his own righteousness so close about him that he feels that it would be an infringement of his dignity if he should step to his neighbor whom he believes is thinking wrongly, and is consequently prone to rule wrongly, and try and persuade him to do right toward himself and his fellows and the future; or that man who stands so high on the pinnacle of his own purity that he can not afford to do anything to encourage another in political well-doing, that man is not doing his political duty, and he knows it. "But what shall I do?" I am not here to tell you; but I do know that Protestant Christianity from the very birth of this country has been the power behind your myriad-headed king. If you will look through the statistics of each census decade you will find that the intelligence, the wealth, the intellect, the power, the heart, the brain of our nation, its vast potential majority is Protestant Christianity. [Applause.] Its spirit came from the same source as our free institutions, and through the same channel. Wherever the spirit of the one is found the other has gone before, or comes hand in hand with it, so that I do know that if the Christians of this land have done their duty to the country, and to each other, there has been no misgovernment. Oh! but you say: "There has been misgovernment, for we have smarted for it." Of course you have, and ought to smart for your own neglect. It is simply the immutable law of God that you should. Whoever has the duty laid upon him to cure an evil and fails, must suffer for it. I never see a monumental display of stupidity that is made in one of our great cities, without rejoicing in it. I like to see a man smart when he smarts for his own fault, if it does not touch his life. It is like a blister—it shows life—at least you can not raise a blister on a corpse. So, I never see the grand reservoir that they have in that city without being glad. It is beautifully sloped and sodded, of splendid masonry, exquisite and perfect, though yet unfinished, costing I do not know how many millions—if there is a Philadelphian here he can tell you—a magnificent reservoir except that it will not hold water. In every other respect it is a magnificent work. And whose fault is it that there is this one defect? It is the fault of that brain and culture that we call Christianity, that sat still year after year and let the dregs of society do the work which God's providence had imposed on them. It is the fault of men who tried to put substitutes in the political army, and, of course, got bounty-jumpers instead. Ah, but you ask me, what can be done? I was talking with a friend from New York about it the other day, and he said: "My dear sir, you are crazy." Said I, "You may call me a fool, but you shall not call me crazy." [Laughter.] "Why," said he, "what would you do if you were in the city of New York?" Said I: "If I had moral pluck, if I had even a substantial gizzard, I would walk up and try to do my duty." "Well," said he, "what could you do? You are a Republican. There are fifty thousand Republicans in the city of New York, and yet," (he says, and he is a man who knows these things, that) about sixty-five hundred Republicans organized into so-called Republican associations there, a sort of political Masonic organizations, which vote men in and out at will, "these sixty-five hundred hold and exercise, in the party organization, the power of the whole fifty thousand." "Well," said I, "you live in New York?" "Oh, yes; I suffer from this." Said I: "Don't you think you ought to suffer? Are you willing to admit that any one of these men is a better man than you?" "Oh, no." "Is any one of the remaining forty odd thousand willing to admit that those are better men than they—stronger, braver, wiser?" "Oh, no." "Yet you allow them to lead you by the nose because you dare not do your duty." [Applause.]

It is not "bosses," my friends, it is not "election machines," it is not "rings" that are to be blamed for misgovernment or to be feared as the cause of future evil. It is you and me, and all of us who bear the brand of personal neglect upon our foreheads. [Applause.] There is at this present time a vast deal of surplus Carlyleism floating around this world—and by the way, let me tell you a story about Carlyle. About the time he died, an apparently ignorant man, a day laborer, was talking with me about him, and said, "Carlyle is gone, then? What do you think they will do with him in the next world?" "Why," said I, "I don't know; what makes you inquire?" "Sure, the Lord will have to find somebody for him to scold, or he won't be easy a minute." [Laughter.] I say there is a vast amount of loose Carlyleism floating around the world at this time in reference to politics, parties, and the like. We are told that we must go back to the good old times when a man was elected because of his personal qualities, and not because he belonged to any party; that we must kill, break, smash the election machines. Smash just as many as you choose, my friends, but do the smashing yourselves. Do n't put in a substitute, nor hire a boy. [Applause and laughter.] If our country has attained any eminence at all among the nations of the earth, it is because of our political idea which we call a party—I do not care what party—but it is that fact which bands the people together in the support of one great idea, to the present abeyance of all other ideas. A great man who has now passed away, when I stood up before him, having just heard that the bill in regard to reconstruction, which I believed would bring peril and evil to the land, had become, so far as the party was concerned, a law, and said: "Mr. Stevens, I will not endure it, I will go home, I will throw the weight of my influence, I will throw the power of my journal against it, and I will defeat it in my State," said to me: "Young man, you do it at your peril. Remember, sir, that a party in a republic is simply a ratchet-wheel that permits and regulates progress. Now it pushes us ahead, and then it keeps us from going too far." And he was right. A party is merely the universal form of a common thought, an idea in the minds of a great portion of our people. A man springs up whose very name comes to represent that thought, like that of the rugged rail-splitter of the Sangamon. [Applause.] That is a party, and he is a party leader. He is not the head of that party. Its head is in your hearts; you are its head, and he is only its obedient arm. Parties sprout from ideas. They are not created by great men. A friend told me this morning as I was coming here, that the revered President Woolsey, of Yale College, was out in a paper laying the basis of a new party. He might just as well try to fly a kite in the Cave of the Winds. Parties do not start at the top of the hill, they come up from the bottom; and, as I told my friend, three negroes with linsey-woolsey shirts, putting their heads together in a cotton field, are more likely to start a party than a thousand such men as President Woolsey. It was Peter the Hermit who started the Crusades that swept over the world, and for five hundred years ruled its very thought. For five centuries men were born for nothing else on earth, it would seem, but to feed the jackals of Palestine. There could not have been a more contemptible source for a great idea than the beggar monk whom we call Peter the Hermit. Parties must come up from below like a volcanic eruption, because you are the governing power, and you must be moved from beneath.

But we are told that the questions still remain unanswered—"What shall be done? How shall it be done?" I do not propose to answer those questions for you. For fifty years and more, this country's heart and brain asked the question, "How shall slavery be abolished?" One said it could not be done in this way; another said it could not be in that way, and the rest said it should not be at all. The

Church, in the main, stood up stoutly in favor of doing nothing. The Christian heart of the country cried out against the evil, but the great query was, "How shall it be cured?" We did not know; we could not tell; we even fought two years against a government builded upon slavery, and carefully refrained from touching it. I remember that as late as September, 1862, I was myself put under arrest in the army of the United States, for refusing to surrender a colored man who had saved my company. [Applause.] We were told that it could not, must not, and should not be done. But when we got squarely to the edge of that last ditch, and found that there was no bridge across, with God's help we built one. [Applause.] When the Christian heart of to-day feels that it must do its whole political duty, when it realizes that the crowning blessing which God's grace has put upon our heads is the invisible crown of co-equal kingship, then we will find a way to do our duty. We shall not do it by seeking to avoid it, nor by telling to our sons and our fellows that a Christian is something too good to engage in the task of government. We shall not do it by shutting out of consideration at any proper time, any of the great questions affecting the good government of the nation. I sometimes believe that I sympathize right smartly with that old prophet in the Scripture, who could not find forcible words enough to curse his people, when I look upon this wonderful land and still more marvelous people of the North; when I think that they have shut their eyes, and sealed their hearts, in a great measure, to the performance of duty; when I see them following a dollar as if it was bigger than a cart-wheel; when I see them anxious merely, it would seem, to coin every golden day into a golden dollar, or some decimal fraction thereof. Even as I speak to you there goes through the country the declaration of one of our great periodicals, that the American people have reached that stage of growth when they can not attend to the work of government themselves; that they have reached that period of development when the cares of business and of life are so great that some way must be devised to cheat the Devil and keep him out of our political Eden without our standing guard on the walls and at the gate. It can not be done. If we are not to govern ourselves, we can never pick out a man to govern for us. There is no patent right for self-government, except the right of every man to push in and take hold, like a poor man at a frolic, wherever he gets a chance. If a man believes he is right, let him cause his influence to be felt. Let it be known. Let him stand for it with his fellows, and let him never hold his peace while he has need to speak. There have been many times in the history of this country, and in the history of different states when, if the Christian public of those states had followed the dictates of their own consciences, and had used their influence, their brain and their power, the evils of which we now complain would never have been heard of, never have been dreamed of. So, while I do not propose to point out to any one of you a specific line of conduct, I do mean to say that any man who leaves a political question to be decided in the country, in his state, in his county, in his township, in his school district, without his help, that man has failed to do his duty. I do not mean by his help just a dead lubber-lift of a vote. I mean that he should be awake, and give so much time as he reasonably may, to make the power of his brain and conclusion felt. [Applause.] When that is done, we will not be troubled with "rings" or "bosses." I do not speak from any sympathy for a "ring" or a "boss" either, and I have not a particle of sympathy for a fallen "boss." [Applause and laughter.] I believe that a man who can not ride, had better not get into a saddle, and I have the most unconquerable hatred for a rising "boss." The man who does or would unrighteously sway the power of any land or nation, that man is my enemy. I can not help it. It is not my fault, either. It is what I got from you and your ancestors. It is what I drew in with my mother's milk, and what I must display whether I would or not. [Applause.]

Now, my friends, I am afraid I have detained you longer than the courtesy of the occasion would justify. I only desire to say one thing more to you as voters—and I do not mean to exclude from the consideration of these questions those who may hereafter be voters, nor those whose influence so often controls votes. We may well, we of the North, take a lesson in this matter from our friends of the South. I do not say that they govern better than we—you all know that I do not believe that—but they beat us in governing. For three-quarters of a century, being then greatly in the minority, as they are to-day, they ruled us with a rod of iron, and we deserved to be ruled, too. They did it because every man, woman and child of them has time to attend to polities. You can not run amiss on that line. You may strike a car on any Southern railroad, and if there are five men in it, you will hear more politics in half an hour than you can start in going from Boston to San Francisco. They mean business, that is all. It is a part of their business, and in that they do their Christian duty. They count for more than you do, because they work harder than you do. They count for more, man for man, because they give more brain to it, man for man. You might well learn a lesson at their hands. I am the last man to say that the South is not entitled to the power that she wields, because she has attained it by a virtual usurpation. So far as the nation is concerned (I mean leaving out of consideration the wrong done to disfranchised individuals and classes) she has stepped upon the platform of self-government, and declared that she had the right to do her level best in moulding the present and the future of our nation, and she has done it. If she has not moulded it to suit you, it is your fault. [Applause.] There is no getting around that, and she will continue to do it. Twenty-four per cent. of her white voters can not read; forty-five per cent. of her entire voting strength can not read. She stands with a compacted power composed of a majority of her intelligence, leading or misleading, as the case may be, this mass of ignorance and compelling it to add strength to her. And she has a right to do so. She has a right to mould her own national destiny as far as she can do it fairly. She stands to-day boldly defying our national idea, and facing with dogged stubbornness the tide of American thought. She has a right to use the weapon which we have put in her hands, so long as she uses it fairly, to sustain her own ideas, no matter who is hurt thereby. If our heads are bruised, it is our own fault, because we neglect our duty and squander our power. The South has a perfect legal right to use the ballotorial power of her ignorant masses to uphold her supremacy and advance the ideas which underlie her civilization. You must not blame her for that. That forty-five per cent. of ignorant voters in sixteen states, is already a tremendously potent factor in our own national destiny. A vote cast or suppressed in Florida affects your interests or impairs your right of co-ordinate control of government just as much as if the act were done in your own precinct. That mass of ignorance is fast becoming a very plummet of fate, on whose vibrations your destiny and mine must depend. As the South relies upon ignorance in this struggle, so must you depend upon light. What shall come out of the darkness, is a problem for the North to-day as well as the South.

It is of far more importance than any other political idea of the present. You must enlighten this mass of ignorance or be destroyed by it. The struggle can not be put off any longer. You must decide which shall prevail upon this

continent—self-government, the unbiassed will of intelligent millions, or the power of ignorant majorities wielded by a few. Not only this, but you must meet in every one of our voting precincts to-day the question how the party to which you may belong shall be ruled. It is pretty well settled that the country will be ruled by parties. There has no other method yet been devised that has borne any good fruits. This has the advantage of not having been devised by any man for the accomplishment of his own purpose, but grew out of the necessities of the great experiment which was being wrought on American soil, and was perfected by the free action of the popular mind. Parties have ruled and will rule. There is no other method by which a free people can govern themselves—by which the will of a majority can be ascertained and effectuated. A question of prime importance now, is how the party itself shall be ruled. There are several patent nostrums warranted to cure party degeneracy. Some of them are stupid, some ingenious, and some infernal. There is but one tonic within my knowledge that is at all likely to cure political pyæmia, and that is, for every good man, every honest man, every Christian to go into the party with which he is in sympathy and make it his own. Let your voice be heard and your influence be felt in its councils. Assert by every means your right to a voice in its control and management. Look after its course as you would after your own business. Do not be a silent partner in the firm which you think ought to sway the destinies of the nation. Let every man, great and small, do his duty and insist upon his right. If the walls of your political Jerusalem have been thrown down, build them up and strengthen the gates. Do your duty, every man of you, day by day, as you would any other duty, with fervency and zeal, and when you have done that for a sufficient time to have faithfulness bear its natural fruits, you will have no more trouble about party machinery—for you will yourselves be the "machine." The work of party organization and management must be done. There can never be any government by the majority without it. The question for you to answer is, simply, whether you will do it yourselves, or leave it to be done by others—whether you will enlist yourself, or hire a substitute. The question lies alone with you.

As I said before, my friends, there is between you and me a contract, that you should give me and my children, so far as in you lies, good government; and that contract is reciprocal between us. It is an obligation that has rested upon us from our cradles. It is recorded in the archives of eternity, with the seal of heaven's high chancery upon it. It has the sanction of him who said, "Do unto others as ye would that they should do unto you," and who announced the penalty of its infraction when he declared that "Inasmuch as ye did it not unto one of the least of these, ye did it not unto me." [Applause.]

ODE.

How sleep the brave, who sink to rest
By all their country's wishes blessed!
When spring, with dewy fingers cold,
Returns to deck their hallowed mound,
She there shall dress a sweeter sod
Than fancy's feet have ever trod.

By fairy hands their keel is rung;
By forms unseen their dirge is sung;
There Honor comes, a pilgrim grey,
To bless the turf that wraps their clay;
And Freedom shall awhile repair,
To dwell, a weeping hermit, there!

ELECTRICITY, THE FORCE OF THE FUTURE.

What is electricity? This is a question which has always perplexed us, and perplexes us still. This perplexity is, however, of little consequence, for we have of late years made enormous strides in the applications of this subtle force. We are now getting a fair acquaintance with electricity, and this acquaintance is giving us lessons as to the sources from which it can best be obtained, and how it can be employed.

We read of the old philosopher Thales rubbing a piece of yellow amber on his rough baize garment, and then picking up with it bits of down and floating feathers. This experiment of the old Greek philosopher, dated 600 years before Christ, seems to have no connection whatever with the elaborate plans now adopted for developing electricity that gives us light of such intensity as to compare with the sun for brilliancy, and heat so intense that it can even volatize refractory carbon. In both cases, however, the force is the same, the difference is in the intensity. Thales not only rubbed the amber and lifted up light substances by its influence, but he endeavored to explain the cause. He said the amber held a soul or essence which was awakened by friction, and went forth from the body in which it had previously lain dormant, and brought back the small particles by the invisible effluvium which it emitted. This was the first hint given to the world of this subtle force which resides in everything, and is as universal as gravitation itself; and from this substance, amber—electron—the name electricity itself is derived.

We have after this no more direct notice of this force till the beginning of the seventeenth century, when Dr. Gilbert announced to the world a list of about twenty substances, which he rubbed, and with them attracted not only light floating bodies, "but all solid matters whatever, including metals, water, and oil." We next hear of Mr. Boyle and Otto Guericke making experiments, and to the former is accredited the first seeing of the electric light, while the latter was the first to make an electric machine. This machine consisted of a sulphur ball which was turned on an axis, and the hand was pressed near it to serve as a rubber. From this, the delighted philosopher obtained not only flashes of light, but the snapping of the electric spark. To this philosopher is ascribed the discovery of electrical repulsion. He observed that when a feather or any light substance was electrified and detached from the surface of the body from which it was charged, it would not again go near that body, but was driven away. Upon these experiments of attraction and repulsion, Otto Guericke endeavored to explain the motion of the moon round the earth, and it was not till the discoveries of Sir Isaac Newton were made known that this notion was dispelled.

Thus little by little more became known. Experiments also proved that certain substances conducted electricity freely and others did not; and that those substances which gave out electricity freely when excited were the very worst conductors, and *vice versa*.

Next came the discovery of the Leyden jar, by which it was found that electricity could be stored up; and a number of Leyden jars were arranged in a series and thus a battery was formed. With batteries of this description Franklin is said to have succeeded in magnetizing steel needles. This is the first notice of the connection between magnetism and electricity. Among other experiments he drew electricity from the clouds by means of a kite, and proved it to be identical with that obtained by an ordinary machine.

A new phase was given to the science when, at the end of the eighteenth century, the discoveries of Galvani and Volta

led to another method of setting free electricity, by the combination called the galvanic battery. In all such battery arrangements electricity is set free by chemical force, *i. e.*, by two metals of an opposite character, one of which readily dissolves in the acid liquid used in charging.

How, then, is electricity produced? In many ways. If we take the ordinary plate or cylinder machine, mechanical energy must be employed to work the machine. This energy is changed into electric energy; in the battery, chemical action of acid on the zinc, *i. e.*, chemical energy, is changed into electrical energy.

We can not create force, any more than we can create matter. A force of one kind can only be gained at the expense of another kind of force. Take an ordinary case of rubbing two bits of wood together: they become heated; the mechanical work of friction is thus changed into heat. In the case of rubbing a piece of amber, sealing wax, or ebonite with flannel, muscular force is used, and the force is transformed into electric force, that gives to the amber, sealing wax or ebonite the power of lifting bits of paper, pith balls, or any light substances. When the force is dissipated, another supply of mechanical energy is necessary to excite the electrical; and we must bear this in mind, that any force generated will give out exactly as much energy as is given to it; but a good deal goes off as heat.

In the ordinary electric machine the electric energy produced is entirely developed from mechanical work; but not all the mechanical work is changed into electricity, for a part of it is dissipated in heat. A very pretty illustration of mechanical force developing electricity is to take two plates of metal, one of copper, another of zinc; having attached to each an insulating handle, join to each plate a wire connected with a delicate galvanometer; on gently striking the plates together a current of electricity is detected by the deflection of the needle, and a similar current is produced on separating them, but the needle will move in the opposite direction. The mere act of stirring up a little milk as it is boiling is sufficient to set free electricity, and even the smallest mechanical action can, under proper control, be shown to produce electricity.

Again, on the other hand, electric action can be changed into mechanical energy, or heating energy; and chemical energy can be changed into heat force and electric energy.

Take, for example, a current of electricity from a battery; this can be carried by a wire, which must be covered with some insulating substance, several times round a piece of soft iron; the iron at once becomes a magnet. It at once, if free to move, arranges itself north and south, and acts in every way like a permanent magnet. Here the chemical force from the battery is changed into magnetic force, which travels along the wire. In fact, the wire itself acquires magnetic powers, and magnetism is only another form of electricity. If we take a helix of wire by itself, and send through it a current from the battery, the wire becomes strongly magnetized, which may readily be tested.

A bar of iron magnetized from a battery is called an electro-magnet. The difference between a piece of iron that is not magnetized and a magnet is, that the former attracts both poles alike, but in magnets like poles repel and unlike poles attract.

Several discoveries of the late Sir Humphry Davy were due to the chemical work which he was able to get out of the first really large battery that was made. This was at the Royal Institution of Great Britain, where he put together as many as two thousand cells of copper and zinc couples. With a current from this enormous arrangement potassium and sodium were first separated in their elementary form from the salts containing them. With this same arrangement which gave such good chemical results, Sir Humphry Davy first produced the heating effect on two charcoal points at the ends of the wires leading from the battery, so as to get a very brilliant electric light. This was the first electric light of any intensity that had ever been witnessed. In this case zinc was being dissolved in the battery by the acid, thus setting free chemical force and heat force of very great intensity. The zinc, in fact, was the fuel employed for supplying the energy.

Still later Mr. Gassiott made a much larger battery, consisting of nine thousand couples; but this has been eclipsed by an immensely larger and more powerful arrangement by Dr. Warren De la Rue. This is the largest battery, we believe, that has ever been made, and consists of the enormous number of fourteen thousand six hundred cells, and its results are as magnificent as the proportions of the battery itself.

Electric force developed in this form from batteries at the expense of zinc is too costly for general employment as a mechanical or lighting agent. The electricity employed for all working purposes is more cheaply derived from the combustion of coal, and the battery for these purposes has been discarded.

The steam engine has become our great producer of electric force, and the one object of inventors now is to get out of the engine the utmost electric energy at the least possible cost.

Combined with the steam engine we must mention the discovery of the late Dr. Faraday, the discoverer of electro-magnetism, who first contrived a very ingenious machine for showing that not only will a magnet revolve round a wire, carrying a battery current of electricity, but that such a conducting wire itself will revolve round a magnet. The powerful magneto-dynamic machines that are now used to produce powerful electric currents are the results of the labors of this earnest philosopher. Another important discovery due to Faraday is that electric currents can be induced or given to wires, or cores of iron, without their being in actual contact with the sources of electricity. The skillful combinations of these principles have been applied in the construction of the Gramme, the Siemens, the Brush, the Bürgin, and the various other magneto-motor machines which are now giving us the electric light at a comparatively small cost. A brief description of the earliest and simplest of these machines must suffice for our purpose; the later and more complicated forms are only more complete developments of the same principles.

A very simple experiment will suffice to show even the most uninitiated what is meant by an induced current. If a small permanent magnet be held near to a piece of soft iron, the piece of iron becomes a magnet and will hold up small pieces of iron or iron filings; on removing the iron from the influence of the magnet, the force disappears and the pieces of iron no longer cling to it. The same effect is produced if a bar magnet is placed in a coil of wire, also if one coil be inserted within another coil. This was the discovery of Faraday in 1831, and it was very quickly applied in the construction of the various magneto-electric machines. The first was made by causing a magnet to revolve close to a double coil of wire, and this developed in the coil powerful currents of electricity. The next most successful arrangement was that which fixed the battery of permanent magnets and made a double coil of wire to revolve close to and opposite the poles of the magnet, before which they are rotated with great speed by an endless band carried round the circumference of the axis and of the large wheel.

As we have referred to both the galvanic battery and the steam engine as our source of energy for working these machines, we may note this difference. In burning coal a large portion of its energy is dissipated in heat, whereas when a battery is employed nearly eight-ninths of its work

is converted into electric energy. One pound of coal, however, will do as much work in a steam engine in driving a dynamo machine as nine pounds of zinc burnt in a battery, and thirty pounds of coal cost the same as one pound of zinc, which is considerably in favor of coal. We have also several engines well adapted for the purpose of driving dynamo machines, working entirely by gas. In many respects these gas engines are preferable to the furnace engines in which coal is used, for they are cleaner and always ready for work. Falling water may also be employed for developing electric energy. This is not merely an idea, but has been worked out in fact, for Sir William Armstrong, at Craigside, near Newcastle, is now using the water from a running brook to work a turbine which produces a force equal to that of a four horse power engine; so, as he says, "the brook lights his house." It has been said that the Falls of Niagara could develop enough electricity to light the whole city of New York, and that the electric current for such a purpose could be brought to that city by means of a small wire. And, further, we may suppose that the Falls are not only able to light the city of New York, but that the electric motors, worked by large turbines, with water diverted from the Falls, could work looms, drive tram-cars and boats, and supply houses with small currents for working even the sewing machine. On the same principle sufficient energy might be developed by the rise and fall of the tidal water of the Thames to light up a great part of the City of London. With proper application the greater number of waterfalls and running streams—energy now wasted—could be utilized, and electricity as an illuminator could be cheaply enjoyed. Windmills could even be employed for the purpose; but the uncertainty of this force could not be relied upon, so that as a substitute merely could it be employed.

The various methods by which electricity is best conveyed from the generator to the spot where it is destined to perform its work must be left out here. Some philosophers of the present day have proposed that we should have gigantic central engines to work dynamo-electric machines, and from these wires should be laid conveying a current of electricity to various towns requiring it for work of different kinds These engines, if steam were employed, should be near to our coal-pits, so as to cheapen as much as possible the cost of production. If placed at the bottom of the coal-pit, the fuel for such an engine could be used without even the cost of bringing the fuel to the surface.

In our remarks we have confined our attention mostly to electricity employed for lighting purposes. We are not limited to this use, for it is already being employed to drive a locomotive in Paris, and a railway made at Berlin by Messrs. Siemens is still successfully at work, while an experiment of the same kind is going on at the Crystal Palace, Sydenham; this may be a mere beginning of its use for putting off our lines the engines worked by steam. Electricity for driving engines on the Metropolitan lines of railway, on our various tram lines, and especially on such a line as is proposed for our Channel Tunnel scheme, would be a very great advantage over the now old steam-engine system. Not the least advantage of using electricity for purposes of locomotion would be the lighter construction of cars, lines, and bridges, thus cheapening considerably the first cost of construction. Another advantage would be that every car would carry its own motor, and would therefore be more easily controlled, both for stopping and propelling purposes.

When electricity is employed either for lighting or engine purposes, the air is not contaminated by carbonic acid gas and other poisonous products, which make ventilation a matter of so much difficulty in all tunnel schemes. Electricity may also be used for heating purposes—water can be readily boiled by its application.

We have not in this paper answered our first question, but we have shown how easily it can be itself converted into an energy of another kind. What electricity will do for us in the future we will not attempt to predict beyond this, that it admits of being employed in so very many ways that it undoubtedly will do more for us than the most enthusiastic amongst us have ever yet ventured to hope. Even while we write we see that a Frenchman has discovered an arrangement by which electricity can be stored in small quantities and made available for household lighting and workshop appliances.

Sir William Thomson's experiments on this battery arrangement are so interesting and important that we can not close this paper without taking some notice of them.

The battery itself, which is called a secondary battery because it receives its charge of electricity from either a dynamo machine or another battery, is the invention of M. Faure. It consists of two lead plates covered with red lead enclosed in felt and, to keep them in small space, rolled up. Those sent to Sir William Thomson consisted of four separate batteries, each rolled into a spiral of about five inches in diameter and ten inches in height. They contained alternate sheets of metallic lead and lead-oxide wrapped in felt moistened with acidulated water. The whole was enclosed in a wooden box of about a cubic foot, and weighed seventy-five pounds. The electrodes were flattened down outside the box, and the battery, after being charged by M. Faure at Paris on a Tuesday, reached Sir William Thomson at Glasgow late on a Thursday evening following, or about seventy-two hours after it was charged. This wonderful "box of electricity," as Sir William Thomson called it, "held in the space of one cubic foot, a power equivalent to nearly one million of foot-pounds." Imagine this box brought all the way from Paris to Glasgow, with its store of electric energy which could be used in any way and at any time, and losing none in its transit! This storing of preserved energy for use at any time, has long been a problem that electricians have endeavored to solve. As Sir William Thomson says, "it is an aspiration which he scarcely expected or hoped to live to see realized." Should the severe tests that this eminent electrician is carrying out prove satisfactory, the problem may then be said to be fairly solved.

One very interesting application was of a surgical kind, and is given by Sir William Thomson as follows: "A few days ago my colleague, Professor George Buchanan, carried away from my laboratory one of the lead cells, weighing about eighteen pounds, in his carriage, and by it ignited the thick platinum wire of a galvanic écraseur, and bloodlessly removed a nævoid tumor from the tongue of a young boy in about a minute of time. The operation would have occupied over ten minutes if performed by the ordinary chain écraseur, as it must have been had the Faure cell not been available, because in the circumstances the surgical electrician, with his paraphernalia of voltaic battery to be set up beforehand, would not have been practically admissible."

The announcement that this marvelous box contained a stored energy equal to a million foot-pounds seemed startling to many who read this announcement in the *Times*. As the amount of energy given out by a machine is always reckoned by what engineers call "units of work," it is well to note what it means. The work required to lift one pound one foot high is called "one unit of work," and to raise one pound ten feet, or ten pounds one foot high, would be ten units of work. So the energy of the electricity stored in this small box was capable, by its proper application to a machine, of raising 10,000 pounds 100 feet high. The wonderful part is, however, that a portion of the energy can be used at one place and a portion at another, and it may be drawn off, as it were, in driblets for purposes requiring small power,

and its total results would be equal to a force required to raise 1,000,000 pounds one foot high. The energy of this battery can be used for lighting, heating, or mechanical work, or it can be divided among all these purposes. We may therefore in a short time probably be able to get in a store of electricity to light our houses, work the sewing-machine, turn a lathe, or boil our kettle; and when this supply is finished, send the box back to be freshly filled. This store of energy, however, must be obtained at a cost less than that of gas to make it popular. But we only have to wait.

In Mr. Hunt's "Poetry of Science" we meet with this expression, which seems to be every year nearer its fulfillment, "Electricity and mechanics promise to subdue both time and space." What, then, will be the future of the energy of electricity?

ODE TO DUTY.

Stern Daughter of the Voice of God!
O Duty! if that name thou love
Who art a light to guide, a rod
To check the erring, and reprove;
Thou, who art victory and law
When empty terrors overawe;
From vain temptations dost set free;
And calm'st the weary strife of frail humanity!

There are who ask not if thine eye
Be on them; who, in love and truth,
Where no misgiving is, rely
Upon the genial sense of youth:
Glad Hearts! without reproach or blot;
Who do thy work, and know it not:
Oh! if through confidence misplaced
They fail, thy saving arms, dread Power! around them cast.

Serene will be our days and bright.
And happy will our nature be,
When love is an unerring light,
And joy its own security.
And they a blissful course may hold
Even now, who not unwisely bold,
Live in the spirit of this creed;
Yet seek thy firm support, according to their need.

I, loving freedom, and untried;
No sport of every random gust,
Yet being to myself a guide,
Too blindly have reposed my trust:
And oft, when in my heart was heard
Thy timely mandate, I deferred
The task, in smoother walks to stray;
But thee I now would serve more strictly if I may.

Through no disturbance of my soul,
Or strong compunction in me wrought,
I supplicate for thy control;
But in the quietness of thought:
Me this unchartered freedom tires;
I feel the weight of chance-desires:
My hopes no more must change their name,
I long for a repose that ever is the same.

Stern Lawgiver! yet thou dost wear
The Godhead's most benignant grace;
Nor know we any thing so fair
As is the smile upon thy face:
Flowers laugh before thee on their beds
And fragrance in thy footing treads;
Thou dost preserve the stars from wrong;
And the most ancient heavens, through Thee, are fresh and strong.

To humbler functions, awful Power!
I call thee: I myself commend
Unto thy guidance from this hour;
Oh, let my weakness have an end!
Give unto me, made lowly wise,
The spirit of self-sacrifice;
The confidence of reason give;
And in the light of truth thy Bondman let me live!

MATTER AND VITALITY.*

The literary world is devoting the closing years of this, the nineteenth century, to an earnest discussion of the respective claims of monism and dualism. The monist contends that the only substance known to the universe is Matter; the dualist holds that, in addition to a world of matter, a vital world exists. The monist would discard the use of vitalistic terms, and explain all the phenomena of nature in materialistic language. The vitalist insists that consciousness, and thought, and will, and feeling, together with the existence of an organic world, is proof positive that this can not be wholly a world of matter. He insists that at every point we should make a sharp distinction between the forces of matter and the phenomena of life, and urges that the latter can originate only in a vital substance —a substance which has properties and forces of its own.

During the last quarter of a century the discussion of this subject has awakened the liveliest interest in the study of the physical sciences; and though a few men have become matter intoxicated, really important information has been given to the world. The question at issue is second to none other that man was ever called to consider. If this is simply a world of matter, then man is a clod, and his highest "destiny is to revel and to rot." If a vital world exist, man is a part of it, and may forever remain a part of it. In the settlement of these great questions science has not advanced a single step. Vitalists have not yet been able clearly to define the ground they should occupy in this great debate. They understand the materialistic side of the discussion far better than their own. Many vitalists of eminence have made concessions to materialism which are fatal to their own cause. From the pulpit, and from the professor's chair doctrines are often taught which logically lead to the grossest materialism.

Fortunately the points to be decided by the public as the jury are questions of palpable fact. It is a fact, or it is not a fact, that matter is endowed with vital properties. It is a fact, or it is not, that matter can work itself into organic structures. It is a fact, or it is not, that matter can reason, will and feel. If materialists can demonstrate the truth of the affirmative of these propositions, they win the battle. But they must prove them to be true, not by syllogisms, nor by deductions, but by a palpable exhibition of the realities they affirm to exist. They must make apparent to our senses real vital phenomena as the sure outcome of matter. They must permit us to see matter work itself into the living organism. They must conduct us across the impassable gulf which now separates matter and thought, and permit us to witness as a fact mind emanating from matter. As they affirm that vitality is but an affection of matter, the laboring oar is in their hand, and vitalists must not be asked to prove a negative. As the result of vast labor in two hemispheres, they have as yet given us only promises of proof—the facts fail to appear, they themselves, as we shall see, being judges.

In some particulars the advantages in this controversy are with materialists. Matter, such as the earth, the air, and water, are fully in the field as real, ponderable, tangible substances, and it can not be denied that matter is endowed with forces and properties many and wonderful; and, then, the superior ability and high character the monistic school has brought to the discussion has secured to its utterances the attentive ear of the literary world. On the other hand, the vitalistic school (if such there be) holds an advantageous position. The instincts of humanity, having the force of divine oracles, accord with their hypothesis

*A lecture delivered in the Hall of Philosophy, at Chautauqua, August 6, 1881.

of man's dual nature, and his longings for immortality. Hence, man recoils with a degree of horror from the idea and the prospect of annihilation. The hypothesis of materialism is in itself repulsive, and we can render it neither reverence nor respect until forced by resistless logic to believe that it is true. The weakness of the cause of vitalism is found in the lamentable fact that its advocates have failed to grasp the true position they should occupy. If life constitutes a part of this universe, it ought to be made to speak out, and to give evidence of its own existence. A presentation of vitalism, if real and true, leaves no room for materialism. Materialism disappears in the manifest presence of vitalism, as darkness vanishes in the presence of light.

Let us then, calmly, and without dogmatism, survey the realm of matter, and detect in its properties and forces its true nature, and if possible, a trace of the vital world. Our physical senses, aided by chemical analysis, and supplemented by the microscope, the spectroscope, and the telescope, give us access to the material universe, and open the doors to its distant and most secret chambers. The microscope supplements the vision of the eye, and reveals to us a world of matter made up of things inconceivably small, which otherwise could have been only objects of intellectual discernment. The spectroscope reveals to us something of the constitution of the earth's sister planets, and of the sun, and of the stellar world. The telescope extends immeasurably the range of natural vision by apparently magnifying and bringing near distant objects. It is thus the material universe is subject to our examination, and we ought to understand what it is.

But scientific materialism has not yet been able to frame a satisfactory definition of matter. The reason is, as Professor Tyndall tells us, we must radically change our notions of matter, because, as defined for ages in our textbooks, it is not possible for the mind to conceive how conscious life could come out of it,—then frame a new definition of it. Permit me to ask Mr. Tyndall: Are we at liberty to form of matter arbitrarily any conception of it we please? Will the nature of matter so change as to conform to our shifting notions of it? Does not loyalty to truth compel us to accept such ideas of matter as a thorough examination of its facts, its properties, and forces suggest as real and true? Has a discovery of new matter been made, or of such new properties of old matter as to justify your half-frantic demand for a new definition of it? Mr. Tyndall makes no such claim. Chemistry has revealed the fact that this globe contains at least sixty-four different material substances, wholly distinct from each other in essence and character. These substances are called primal, or elemental bodies. Should other material elements be found the nature of the problem under consideration would not be changed. Each different elemental atom is an unknown essence; it is a simple substance, and wholly unlike all the rest. There is nothing in any one element which is in any of the other elements. Each atom is, in itself, a perfect individual entity, and the entity of matter is found only in its atoms—organisms are like shadows, dreams, or shifting clouds. All the atoms of the same element are alike, one atom can not be changed into another; of the essence of an element or how the essence of one element differs from another we know nothing. Atoms are invisible to the eye and insensuous to the touch. An elemental atom magnified ten thousand diameters is still invisible—they must be less than the millionth of an inch in diameter. Of the form and structure of atoms we can form no conception.

Elemental atoms may be defined as peculiar, primal, indestructible, and unchangeable bodies of matter, each one having an essence, properties and forces peculiar to itself, and only one of which can occupy the same space at the same time. The term matter may be defined as embracing the sum total, or any part of the atoms of the universe.

The existence of the atomic world we must recognize by a necessary intellectual discernment. The visible mass necessitates the existence of the molecules of which it is made, and the existence of the molecules necessitates the existence of the atoms of which it is composed. Atoms must be inconceivably small. An invisible molecule of musk must be composed of millions of atoms, since it will impregnate for many months hundreds of cubic feet of air. Whether the presence of a single atom of any kind can be detected by any of the senses, is not positively known, but *very* doubtful. Man seems to occupy that place in nature which is midway between atoms and worlds, both extremes being beyond his reach; and it is probable that the greater part of the universe exists beyond the sweep of both the telescope and the microscope. Each atom is as inconceivably small as the universe is inconceivably great. And, then, science asks us to believe in the reality of a world of matter which is wholly distinct from the world that is composed of the known atoms. This matter is called the luminiferous ether, and we are taught that it pervades all known space. Associate with the word space the idea of an immensely attenuated jelly-like, incompressible substance, which is sensitive to the slightest touch of heat, and you have an idea of the luminiferous matter of the universe. On this tremulous ether, which, as it strikes the eye, takes on the form, or produces the sensation of light, the effects of the heat of the most distant visible stars are brought to us. Of the nature of this substance we know nothing. Its existence is a matter of inference. The phenomena of heat and light indicate that such a substance, called sky matter, must fill the inter-stellar spaces.

In harmony with the above atomic conception of matter, the idea has forced itself on the mind of geologists that the matter of this globe was once in the condition of a fire-mist. That is, under the influence of a heat which was inconceivably intense, each atom was made to occupy an isolated position—no two were united. All was chaos, without form, and void of union or mixture, or organism. To an observer, such as ourselves, the matter of our globe at that time could have been visible only as a dim nebulous light, much like the tail of our departing comet. In that condition its diameter must have been equal to that of our sun, perhaps much larger. As a cloud of fire-mist, oval or greatly elongated in form, and occupying immense space between Venus and Mars, it swept for ages around the sun.

The matter of the globe in nature and essence was then exactly what it is now. No atom has changed; not one has been lost. A new one has not been created. If matter possesses vitality as a property now, it did then. Oxygen constituted one-half this fiery spray; silicon one-fourth; aluminium, magnesium and calcium one-fifth; potassium, sodium, iron, and carbon one-twentieth; sulphur, hydrogen, chlorine, and nitrogen one-fortieth; and the remainder, one-fortieth of the matter of the globe, is composed of the remaining fifty-two elements, such as phosphorus, gold, silver, zinc, tin, mercury, iodine, *et cetera*. Thirty-nine-fortieths of all the matter we know anything of is composed of thirteen elements, namely: oxygen, silicon, aluminium, magnesium, calcium, potassium, sodium, iron, carbon, sulphur, hydrogen, chlorine and nitrogen. These elements give us the air, the water, the ground, rocks, salt, the matter of organic bodies, and all those substances with which we are most familiar. The world of matter has no veiled inner sanctuary. It has no mysteries, nor wonders greater than those we meet in the running brooks, the stones by the wayside, or the ground on which we tread.

The heat that could overcome all the cohesive forces of matter and hold the atoms thus distant from each other

must have been awfully intense, and the fact indicates that an indescribable war among the atoms once existed. Oxygen, being one half the matter of the earth, because of its varying affinities for the elements of the other half, generated and long sustained this conflict. These forces of matter have not been destroyed, their active operations have been only partially suspended in a state of equilibrium; and according to both science and revelation the fire is now kept in store for dissolving earth's rocky masses, and by an all-pervading, fervent heat, remanding the matter of the globe back again to its elemental condition. This baptism of fire may be the completion of a cycle of time. This has been, and is, and is yet to be, largely a fiery universe.

It is probable that the matter of the globe continued in its condition of fire-mist during a long period of time—say four or five thousand years—and then it gradually became an incandescent mass, enveloped in clouds of hot vapor.

I now inquire: In such a furnace of atoms and in such an ocean of fiery billows, could any kind or form of organic life known to us have existed? Could it have existed for a moment, to say nothing of the seethings of thousands of years? If at that time vitality was a part of the globe it must have inhered in the white hot atoms of the fiery spray. Materialists are welcome to their assumption that such was the case.

Let us give to this igneous mass of matter some thousands of years more—say five, ten or twenty—and note the effects produced by the operation of its own laws and forces. I find that oxygen has in vast quantities united with silicon, and formed what is now the granite crust of the earth; oxygen has united with hydrogen and oceans appear; oxygen has united with carbon and heavy clouds of carbonic acid, miles deep, envelop the globe like a black swaddling cloth. It is probable that such a cloud envelops Jupiter today, concealing from us the body of that planet. Oxygen mixed with nitrogen, formed the air which rested upon the heavier cloud of carbonic acid gas. Oxygen united with iron, copper, sulphur, calcium, and the accumulation of metals and minerals began. This powerful element-king, constituting, I repeat, one half the matter of the globe, is everywhere, and every other atom feels its power. Other elements are also at work. Chlorine unites with sodium and salt is formed: nitrogen and hydrogen give us ammonia; oxygen and sulphur, the oil of vitriol, and thus the action and reaction, and interaction of atoms, molecules and masses sustain among themselves an indescribable conflict. As Pope says:

"All subsists by elemental strife."

Matter, under the operation of its laws, has given us the waters of the globe, its rocks, its mountains, the earth, the air, with the phenomena of winds, waves, earthquakes, volcanoes, and the numberless chemical changes which are constantly going on. The elemental atoms can never change. Oxygen must be now exactly what it has ever been. The least modification of this substance would destroy the air, the waters of the globe, and so change every other part that earth would be unfit for man's habitation. But matter is absolutely perfect for the purpose of its creation; and the Creator has endowed each atom with such properties and forces, that it cannot be changed. During all the ages of the past, matter has been the matter it is now, and nothing else. We may examine matter in all its myriad forms—in its elemental state, or as molecular aggregations of atoms, or as a combination of molecules, or as a heterogeneous mass, or in the crystalline form, or as a celloid substance, or as a gas, a solid, or a liquid, and not the slightest trace of vitality or organism can be detected in it. Were we not so familiar with the organic world, the sight of matter wrought into a structure would strike the mind as wonderful. How strange that earth should take on the form of a bird and fly and sing through the air! It is a weighty consideration that, as an organism, matter is never seen except as a living structure. This one fact proves beyond the possibility of contradiction, that life is the cause and the basis of organic bodies. Without a pre-existing vital principle, an organism cannot exist. On this rock vitalists may stand and defy opposition. Suppose we should see school-boys take bricks, and try to draw out of them wings that they might fly like birds, or fins that they might swim like fishes, or legs that they might run like squirrels, we would say of the youngsters that they had lively imaginations, but not much practical sense, and that they would not succeed. Supposing also we should see the learned materialists of America, France, England, and Germany, undertake out of a brick, or out of any kind of matter on the globe, to spin a hair, or form a grain of mustard seed, or construct a bone, a muscle, or a nerve, or even a speck of bioplasm, we would say these Huxleys, Tyndalls, Spencers, Haeckles, and Helmholtz's, were men of lively imagination, but that they were engaged in a hopeless undertaking. The boys would be quite as successful with their bricks as the scientists in their attempts to work any kind of matter into a living structure. The boys and their bricks are matters of mere supposition, but volumes would be required to make a record of the serious attempts materialists have put forth, using all the resources of the laboratory, to form of matter living structures—but always in vain. They, and their work, in reference to results, deserve to be classed with the boys and their bricks.

We are now touching a question of fact; a fact, too, of the first importance. If life is a property of matter, the fact would have been ere now palpably demonstrated. Let us hear Prof. Tyndall on the subject. The following are the closing words of his recent lecture on the "Origin of Life" before the Royal Institution in London. He said:

"This discourse is but a summing of eight months of incessant labor. From the beginning to the end of the inquiry there is not, as you have seen, a shadow of evidence in favor of spontaneous generation. There is, on the contrary, overwhelming evidence against it; but do not carry away with you the notion sometimes erroneously ascribed to me, that I deem spontaneous generation 'impossible,' or that I wish to limit the power of matter in relation to life. My views on this subject ought to be well known. But possibility is one thing, and proof is another; and when in our day I seek for experimental evidence of the transformation of the non-living into the living, I am led inexorably to the conclusion that no such evidence exists, and that in the lowest, as in the highest of organized creatures, the method of nature is that life shall be the issue of antecedent life."

On this subject Tyndall is an extraordinarily good witness, inasmuch as he earnestly desires that spontaneous generation may be true. It is the missing link in the chain of his philosophy. If that gap were firmly closed with an indisputable fact, materialists would command the field. But to-day all the facts are against them. Prof. Bastian, Haeckel, and others have coaxed and tortured all sorts of matter to induce it to give forth life, but in vain. In the face of a multitude of facts—facts the most favorable to the cause of materialism that the genius of man could combine, Prof. Tyndall is inexorably led to the conclusion that the method of nature "is that life shall be the issue of antecedent life."

It as fully accords with observation and experience that fire should flash from a fragment of ice, that a figure should be at the same time a circle and a square, or that a stone should take on wings and fly, and sing like a bird, as that matter should give the least evidence that it possesses vitality as a property, or that it has the power of self-organization.

That the Creator in the beginning, richly endowed matter with various properties and forces, is fully conceded. That we might be blessed with the air we breathe, oxygen and nitrogen were made to be just what they are; that we might have the waters of the globe in great abundance, an abundance of oxygen and hydrogen were made. Each one of the sixty-four elemental atoms has been thus arrayed in a full complement of forces of its own, and for specific purposes. Each one adds its quota to the energy displayed by a world of matter. Not an element was created without a specific purpose. Our old philosophers and our modern Joseph Cooks made a mistake when they ascribed to matter inertia as a property. If matter were always inert, there would be no chemical changes, no expansion and contraction of bodies in a varying temperature, no earthquakes, no volcanoes, no winds would blow, no waves roll upon the ocean's bosom, and no clouds would float in the sky. Endow the matter of the globe with one common force, and inertia would be its condition. But the number and variety of the forces of matter are incalculable, and they are in constant collision, rendering it impossible that matter thus affected should be inert. Inertia is not a property of matter, but the term describes the state or condition an isolated atom or mass of matter may chance to be in, at a time. A state of war, as we have seen, is the normal condition of the forces of matter, and oxygen is largely the generator of the strife. Having an affinity for all other substances except fluorine, but for some a much stronger affinity than for others, it is constantly breaking up old alliances and forming new ones, and modifying every other force of material nature. But this war of elements has long been on the wane, the earth is not what it has been; it is growing old and feeble. Its volcanic fires are nearly all extinguished or burning low, its earthquakes are few and faint, and the languishing war of the elements is proof that the forces of nature have largely found rest in a state of equilibrium. But this work is not yet completed, the forces of matter are still working on, and the pendulum of time may swing yet some thousands of years before nature shall strike eternity. Such is matter, such its endowments, and such its achievements.

Let us now consider the vital and organic world. That *facts* are still to engage our attention is an important consideration. It is an unquestioned fact that organic bodies, such as seeds, plants and animals, exist, and in great variety, and in vast quantities. It is a conceded fact that the present surface of the earth is largely composed of the matter of ruined organisms, animal and vegetable. The organic world, as it exists, is a world of wonder. That matter should be wrought into a spear of grass, or into any other structure having organs, is marvelous indeed. That the chisel of the artist should bring an angel out of the marble is nothing compared to the sight of a flower or a tree that has sprung out of the ground. What are the waters of the ocean compared to its living finny tribes; the air to the birds that wing their way through it; the desert to the fleet-flooted antelope, and suns and stars compared to a mind that is measuring their magnitude and weighing them in balances! What is the formation of a crystal of quartz compared to the structure of the human form? The crystal, which is the highest achievement of mere matter, is a body of universal sameness of substance and of composition. The body of man embraces many kinds of matter, wrought into a multitude of organs, and all so correlated to each other as to form the unit, man. The heart organ is in itself a marvelous structure; then it is correlated to the veins, the arteries, the lungs, and the blood; the veins are correlated to each other, to the blood, and to every part of the body; the blood is a wonderful fluid which acts complicated and manifold parts. The eye, as a piece of optical mechanism, is composed of many distinct pieces, every one of which by itself would be worthless for the purposes of vision, but, put together as they are by some intelligence, they form a perfect optical instrument. In its construction a complex plan, or rather a series of plans, were carried into effect. There was first, a proper formation of each part by itself; second, the formation of each part in reference to all the other parts; third, their adjustment to the luminiferous ether; fourth, their adjustment to external objects; fifth, to the vital or mental part of the organism. A clear conception of the organic world would embrace a perfect knowledge of anatomy, physiology, animal and vegetable chemistry, botany, and natural history. The vastness and variety of facts connected with this subject surpass the knowledge of any man. We can but see in it a bewildering display of the wisdom and the handiwork of the Infinite Mind. An entire globe of mere matter contains nothing so complex and marvelous as a blade of grass, or a worm. The organic world, in every department, impresses the observer that it contains an essence and a something which is wholly distinct from a world of rocks, earth, and water. A tree standing in a desert is no part of that waste; an eagle perched upon a mountain crag is no part of the rock; the Arab is wholly distinct from the tent which shelters him from the storm.

From whence came this organic world? A world composed of material bodies, having organs, and alive, is something very peculiar. We have seen that life is not a property of matter, and that matter is unable to work itself into an organic structure, but here we are, organisms ourselves, living in the midst of a vast and beautiful organic world.

Results so numerous and so great must have a palpable cause. But Professor Tyndall says that the existence of the organic world is an "insoluble mystery." Other learned men, and most of them Christian scientists, universally say the same thing. That ground has been occupied and persistently held, even by Chautauqua lecturers. Now, nothing is easier than for us to doubt and disbelieve, and surround ourselves with mysteries, *ad infinitum*. I can deny that the sun is a luminous body, and then say in regard to the light which surrounds us to-day, that its presence is an "insoluble mystery." If, because I can not see the atmosphere, I deny its existence, then the phenomena of clouds floating above our heads will be an "insoluble mystery." Should we deny the reality of our earthly parentage, then our existence in this world would be an "insoluble mystery." Tyndall is a monist, and he denies the existence of life as anything real. Hence, the presence of the organic world is to him an "insoluble mystery." Grant the hypothesis that a vital world exists, and the mystery vanishes. It is a conceded fact that life and organic structures are always found together. Without the life, as Mr. Tyndall admits, an organic structure can not exist, a life "can come only from antecedent life." If life, then, is the cause of organisms, if it is the architect and the builder, then their existence is not a mystery. But materialists reply that the organism is the cause and life the result. That position implies that matter works itself into an organic body, and that life results from the organism. But we have seen that the realm of nature furnishes not an instance of the self-organization of matter. Such a suggestion is highly misleading. Even Herbert Spencer is compelled to admit that life pervades the organism, and that life is the cause of the structure. Surely, the living oyster is the cause of its organic shell; the life of the acorn is the cause of the organic oak, and every plant, every tree, every bird and beast, and everything that lives, has a life that is *its*, and that life is the builder of the organism. Life is, then, something more than an influence, more than a force; it must be a substance. Many writers speak of the organic

world as being composed of matter, power and force, power and force being classed with matter as reals. Nothing can be more absurd or misleading than such a use of these terms. Power and force are not substances; they express an energy exerted by a substance. Without the substance as the cause they can exist only in idea. This misconception of these terms has rendered worthless most of the philosophy of modern times. We have power and energy only when some substance for the moment gives them birth.

It is impossible for us to solve the problem of the existence of an organic world, only on the hypothesis of the existence of a real, substantive, vital world. The vital world, through organic structures, becomes incarnate, and manifest unto us. Though the two worlds—Matter and Life—meet, they do not mingle into one, nor exchange places. We have no material life, nor vital matter. Life is life, and can be nothing else; matter is matter, and can be nothing else. The life works the matter into organic bodies.

But materialists say: If the life of the acorn built the oak, and if the life of the egg produced the eagle, and gave it its peculiar characteristics, show us this substance and it sufficeth us. Bring vital substances as fully into the field of observation as matter is there, and we will believe they exist. Well, let us first see how fully matter is before us. Let us see if, in this respect, a parallel can be drawn between the vital and material worlds. Material atoms are unknown to us, yet these atoms are the causes of all material phenomena. On the other hand, unknown vital essences are the causes of all vital phenomena. I say to monists: Show me the essence and the cause of material phenomena—that is, exhibit the primal atoms or their essence—and I will show you the essence and the cause of vital phenomena. We accept with materialists the atomic theory of matter as true. Indeed, the facts of the case compel our assent. But an atom is so very small that its presence can not be detected by a lens that magnifies two thousand diameters. Atoms, matter, primal state things, the materialist believes in, but he can not show them to us. The universe is built of atoms which are as unknown to sense as vital elements. What we see and feel of a stone or a lump of earth is phenomenal, and gives us no idea of the atoms and the essences of which they are composed. Masses of matter are results of aggregated atoms. Matter has its only entity and permanent individuality in atoms.

In appearance oxygen and nitrogen gases are very much alike, but in fact they are not at all alike. Why? Because in essence the one is one thing and the other is wholly a different thing. No mortal mind can form an idea of the essence of either. Both the atoms and their essences are wholly unknown to us except in their phenomena. The properties and forces of all molecules and masses of matter have their origin in the unknown essences of their elemental atoms. If you say, show us the vital substance which causes vital phenomena, we confess our inability to do it. We can exhibit only peculiar phenomena, which must have a vital origin. If you interpret our limited knowledge of vitality as implying a weakness of our cause, we demand that you exhibit to us the essence of matter. Or, as you can not do that, we call for a sight of the primal atoms in which the essences reside. But this can not be granted. A great number of atoms must be massed that the senses may recognize anything, and then we do not see the atoms as they are, but a mass which gives us no idea of the atoms; of the form of the atoms we know nothing. Think of atoms less than the one-millionth of an inch in diameter! Have all atoms the same form, or different forms? Are they angular, oval, oblong, or square? We can not form a conception of anything so small. All our ideas of matter are formed from its manifested forces and phenomena. On the same plan and in the same way we form our ideas of life from its forces and phenomena. Of the essence or primal form of either we know nothing.

The phenomena of life are far more marked and conspicuous than the phenomena of matter. Compare the growing, blooming rose with a pebble; the busy bee with a snowflake, which is matter's highest achievement; the eloquence of Demosthenes with the dull, thoughtless, thunder of Niagara. Which set of phenomena are the highest in the scales of nature? Which the most fully indicates a real substantive cause? Which should hold precedence in nature's order, Niagara's roar or the song of the Iliad?

What we know, and what we do not know, and what we may reasonably infer concerning matter and life, may be summed up as follows:

First—Of the origin of matter and life science teaches us nothing.

Second—The atomic theory of matter and the elemental character of life may be accepted as true.

Third—Of the essence of material atoms and of life elements we know nothing.

Fourth—The atomic elements and vital substances can not be brought within the range of such senses as we now have.

Fifth—Each atom of matter and each vital element have properties and forces which are exclusively and respectively their own; and there is nothing in any one atom or element which is in another of a different kind.

Sixth—Material atoms and vital elements are known only by their peculiar phenomena; the phenomena of material atoms being aggregations of atoms, and the resulting properties and forces; the phenomena of life being the organization of material atoms into living structures, also thought, will, and feeling.

Seventh—An aggregation of elements, forming a mass or a visible body, is a phenomenal exhibition of matter, and only in the mass does matter exhibit itself to us; it is also true that the only exhibition which life makes of itself to us is of a phenomenal character through organisms and by the action of consciousness, thought, will, and feeling.

Eighth—If the simple phenomenon of the aggregation of atoms proves the existence of the atoms, the phenomenon of the organization of the atoms into complicated and delicate living structures proves the reality of vital elements.

Ninth—Material atoms invariably act in their own peculiar material ways, which are not in any one particular the ways of vitality; and vital elements act in their own peculiar ways, which are not in any respect the ways of matter.

Tenth—Matter and life form two kingdoms, separate and distinct in essence, but analagous in their mysteries and manifestations.

Eleventh—The essence of life is as fully in the field of observation in the organic world as the essence of matter is in the inorganic. The argument that proves the entity and reality of matter proves also the entity and reality of life.

I have called your attention to the substance known as the luminiferous ether. Our scientists teach us that light is a sensation produced upon the retina of the eye by the tremors or undulations of this substance. That is, as far away as the farthest star we can see, and perhaps farther by a thousand or thousands of times, there is no vacant space; a greatly attenuated jelly-like substance exists everywhere, as the medium in which all worlds float; that this substance is set in motion by heat, and that its tremor-like undulations, coming in contact with the eye produce the sensation we call light. If a sun or a star exist outside of this luminiferous ether, it burns and flames away in total darkness. I ask our materialists to show me this luminiferous ether, or show me what it is. Is it oxygen, or carbon, or is it

some new kind of matter—something not included in the sixty-four known elements? Is it a single and all-pervading element, or is it a compound? If a compound, of how many elements is it composed? Materialists can answer none of these questions. They can only say: We have no doubt of the existence of this luminiferous ether; without it we can not explain how light can travel 186,000 miles—nearly eight times around the earth—in one second. It must be a jelly-like, incompressible substance, for if touched by a breath of hot air in one place the whole substance feels the tremor. I say to the materialist: Your ether is then an unknown and an undiscoverable substance, as intangible and imponderable as life itself, and its existence is a mere matter of inference. The sole proof you have of its existence is the phenomena of the rapid travel of light. If on such evidence you believe that an unknown kind of matter fills all space, why not step upon ground a thousand times as strong and accept vital phenomena as proof of the existence of vital substances?

Were this luminiferous ether composed of one or more of the sixty-four elements with which we are acquainted, an aggregation of its atoms would take place, and then it would be subject to inspection. But the luminiferous ether seems to be peculiar, and not composed of any known matter. Should vitalists adopt the hypothesis that there is still another kind of matter whose presence can not be detected; which in essence is unlike the luminiferous ether, and that this peculiar sort of matter is always germinal matter, and nothing else, our assumptions in boldness would not exceed that of materialists. Our argument does not require us to build on such foundation; yet we may inquire if it is not likely that the spiritual bodies spoken of by Paul are composed of such a substance. Who will dare say that there are not kinds of matter which are unknown to chemistry—matter wholly unlike the sixty-four known elements? Believing that vitality is as fully in the field of observation as matter, I now turn to a more specific consideration of this part of our subject. The value of what may be said will depend wholly upon the correctness of our reading and rendering of nature. Learned opinions about what nature ought to be are of no consequence in this discussion. We should sit humbly at nature's feet and receive instruction from her. A fact of nature has all the force of a revelation from God. The Great Teacher, whilst among men, selected as texts the lily of the field, the sowing of seed in the ground, the vine and its branches, the fig tree, and many other things from different departments of nature.

So, if we would understand the vital world, we must study it as it is. If, like Dr. Lionel Beale, Dr. McCosh, and others, we make vitality a question of physiology, we make it a question of matter and of death. We have seen that matter does not possess vitality as a property, and that it can not work itself into an organic body. I now turn away from matter, except as an attending incident, and look at the workings and achievements of vitality. As a familiar illustration of the vital structure of the vegetable world I look at the full grown and maturing stalk of corn. The flowing silk and the waving tassel are its most striking features. The facts in regard to them are quickly stated and easily comprehended, but they contain lessons of wisdom which reach to every part of the vital world. That stalk of corn contains in itself volumes of the most important knowledge, and this knowledge will be free from error. It is a book in which not a mistake has been made. A substance which we call pollen—in appearance a fine dust—adheres to the tassel of the stalk, and each particle of that dust contains a vital principle—a principle which is as undiscoverable as the essence of an atom of matter; in that open, exposed, flowing silk is also contained a vital principle, or perhaps I should say, a vital capacity. The tassel and the silk are correlated to each other. Only together do they form complete unity. If left to themselves they are powerless, and probably perish. But the pollen of the tassel, as if guided by a divine hand, is brought into contact with the silk of the stalk; its mysterious nature is waked to action, the two vital principles blend into a vital entity, and as a result, the identical life-entity which was planted in the ground reappears, and is multiplied thirty, sixty, or a hundred fold. The life of the kernel has, without a break, simply performed a cycle. The same life had performed thousands of such cycles before. The matter of the stalk, too, had seen all the years that belong to the age of matter. The organism of the stalk was intended to be only temporary—a material organism has no permanent identity, but a life element continues the same. The identity of matter is found only in the atoms. The matter of all organisms now existing may have been a part of thousands of organisms during the long past. The life, in passing from one organism to another, experiences no radical change. Its identity ever remains the same. We can trace the vital history of the corn as distinctly as its physical history. The life is endowed by the Creator with the force which coöperates with the forces of matter, and builds up the organic structure.

The lowest form of vitality known to us, is the vital principle, and the highest the vital entity. Bioplasm is a vital substance, but it does not contain a vital entity. The vitality of bioplasm has no correlate in nature. It multiplies, not by generations, but by self-division—by breaking up into parts. The law of nature which governs in this case, applies to millions of different living forms in the lower strata of both the vegetable and animal worlds. The presence of a vital entity implies completion to the individual, and a capacity for reproduction by germination. A living thing, actuated only by a vital principle, can multiply only by self-division.

A multitude of facts indicate that vital principles and entities differ greatly one from another. As differ the organic structures of the animal and vegetable worlds, so differ the living substances which build them. We know as little why, how, and wherein one kind of life differs from another as we know why, how, and wherein one material element differs from another. The naked fact that there are differences is all that we can hope to understand.

Every organic structure and its life sustain to each other the relation of cause and effect—the life the cause, the structure the effect. The elephant is an outward visible expression of one kind of life, the Canary bird of another. Physically man has a life that is *his*, and solely his. That life is not the mind nor any part of it. Mind is another entity, associated for the time being with the body. Every organic thing that lives, in both the vegetable and animal world, is the product of a life that is its.

The egg of a turtle differs but little in its physical structure and composition from the egg of fowls. Let us bury some half a dozen eggs of different kinds in the warm sand on some tropical coast and note the results. At the proper time from one egg emerges a turtle, which creeps into the water, and buries itself in the mud; from another an aquatic fowl, which swims off on the surface of the sea, and from another an eagle, which soon makes it way to mountain crags. In matter the eggs were substantially the same, the difference in results is to be ascribed to the simple fact that each possessed a different vital entity. It must have been the life and not the matter of the eggs which gave character to the results.

Let us carry this principle into the vegetable world and see if it holds good there. Are vital elements as tenacious of their individuality among plants as in the higher animal world? On the same day, in the same soil, and only a few yards apart, I plant an acorn and a chestnut. That the

ground, the seasons, the dews and rains, the sun and atmosphere will have an influence upon those seeds and upon the trees that grow from them is to be expected. Both will grow in the same medium, both feel the full influence of the same environments. The matter of the acorn is much the same as the matter of the chestnut, and in both cases it merely serves as nourishment for the vital germs. The forces of the sun, and of everything material connected with the two trees tend to make them exactly alike; as in castings, the same moulds give us the same results. But what are the actual facts in the case? In the acorn there was a somewhat which gave us an oak, and in the chestnut there was a different somewhat which gave us a chestnut tree. Each seed produced after its kind. The life of each seed tenaciously maintained its identity, and controlled the forces of the sun, of the air, of the ground, of the rains, and of the seasons, and wrought according to its own nature and plan. Life's forces governed and coördinated the forces of material nature so that in every minute particular its own nature found complete development. As the two trees differ in structure, even down to the smallest fibre, so do the life substances differ which wrought matter into organisms in each case. Everywhere else in the realm of vitality, as well as in these instances, each organism is a product of a life that is *its*.

But, says an objector, this is taking a very plain and common sense view of the most intricate and difficult of all problems. Yes, that is so. Our argument implies that truth and not falsehood adorns the face of nature—that she wears no mask, and that facts are laws, and appearances reality. *A priori* reasoning about what nature ought to be is not worth a moment's consideration. The Duke of Argyle, one of England's best men and profoundest thinkers, has said: "It often happens that the philosophy expressed in some common form of speech, is deep and true, while the objections which are made in the name of science are shallow and fallacious." As I have ventured a definition of matter I will try my hand at a definition of life. Life embraces that part of nature which so acts upon the forces of matter as to work up material elements into organic structures. The vital kingdom, which we call vegetable, gives us only vegetable structures. Vegetable organisms constitute the basis of the animal kingdom. Vegetable life works elemental atoms into bioplasm and molecules, and these by animal life are built into animal structures. Man's physical organism is the product of his human life, just as an animal organism is the product of an animal life. Man stands alone in creation, and refuses classification. He is not an animal, he is a Man. His body is an organism occupied by an intelligence.

If our reading of the ever open volume of nature is correct, the hypothesis of evolution and natural selection must go to the wall. They cut only skin deep, and the vital substance which controls the organisms they do not pretend to touch. To succeed, Darwin and Spencer must show that one kind of life can become another of a different kind—a task as difficult as to make gold iron, or iron gold.

My task is done. Wherein have erred I have not read nature aright. She is infallible, and her voice is the voice of God.

This, then, is primarily and really a vital universe, and in this sense it is like its maker, God. Life has wrought more.

AH, SUNFLOWER.

Ah, Sunflower, weary of time,
Who countest the steps of the sun,
Seeking after that sweet golden clime
Where the traveler's journey is done—

Where the youth pined away with desire,
And the pale virgin, shrouded in snow,
Arise from their graves, and aspire
Where my sunflower wishes to go!

SOME WONDERS OF THE SEA.*

CORALS.

Whether dropping "like the gentle dew from heaven upon the world beneath;" whether falling in tropical rain torrents, and tearing its way seawards through solid rock; whether floating gently downwards in feathery snowflakes, or crashing all before it in the form of icy hail, the water which has been suspended in the atmosphere finds its way back to the sea, whence it was evoked by the sunbeams.

But it does not return unaccompanied, for the water that has rushed through many regions carries with it samples more or less discernible of the soils through which it has passed. Among others, an enormous amount of calcareous earth is continually poured into the sea by each river that reaches the final destination of its respective watershed.

What is to become of all this calcareous earth? If nothing were done with it, the sea would be so constantly receiving fresh supplies of solid matter, that the water would be gradually thickened, and daily become more like mud than water.

It cannot be destroyed, because destruction, as we understand the word, does not exist in nature. But it can be modified, and agencies may be imagined by which the calcareous matter is extracted from the water, and built up into fabrics which, though they differ in form from the chalky mud, are identical with it in material.

There are many such agencies, silently, slowly, but surely in constant work, and one of them I shall briefly describe in the following pages.

We know them, or rather the results of their labors, by the very comprehensive word CORAL, under which title are grouped a vast number of forms, all composed of calcareous matter, but differing greatly in the shapes which they assume, and the structure of the living agencies which make them.

We have all heard of "Coral Insects" and their work; and scarcely a generation ago the young learner was taught that the Coral Insect was the founder of tropical islands, having raised its edifices from the depths of the ocean, and only being checked in its labors when it reached high-water mark. There is a certain amount of truth in this statement, but more than an equal amount of error is mixed with it. In the first place it is scarcely necessary to mention that the coral formers are not insects, but creatures of an infinitely lower organization; and, in the next place, they can only live within a very limited distance of the surface of the water.

Putting aside the systematic division of these wonderful creatures and their productions, we will consider them all as Corals, whether they be true Corals, Madrephylles, Gorgonias, Tubipores, Alcyonidæ, etc., etc., and trace, as far as the limits of these pages will permit, the course of their lives, and the nature of their horny or stony skeletons.

Some of these beings are much more simple in structure than the others, and we will therefore begin with them.

Supposing that we take a rather coarse sponge, especially if it has been in use for some time, and compare it with the common Mushroom Madrepore, we must at once see that there is a marked analogy between them, even though we are only looking at the dead skeleton.

In fact, if we could take a common sponge, and transmute it into stone instead of silex, we should have an object so exactly like a madrepore that it would be very difficult to distinguish the one from the other.

If we were able to procure their living investments, we should see an analogy and a resemblance between them, but not an identity.

*Good Words.

The Sponge animal belongs to the great group of Protozoa, the very lowest form in which animal life can definitely be said to exist. But the Coral animal belongs to a more highly organized group, the simplest of which is called Madrephylle, and the most complex are popularly known as Sea Anemones.

Scientifically they are called "Anthozoa," *i. e.*, Living Flowers, because in many of the species the tentacles have so floral an aspect, that for many centuries they were considered to be flowers of the sea, having, like the sensitive plants, the habit of contracting when touched.

It is only with those Anthozoa which deposit a solid skeleton that we have at present to deal, and so we will proceed at once to the Madrephylles, the best-known example of which is that which has been already mentioned.

If we look at the upper surface of the Madrepore, we shall see that it presents a curiously striking resemblance to the under surface of the common mushroom, a number of thin laminæ, or stony plates, radiating from a common centre, just as do the vegetable "gills" of the mushroom.

Turn it over, and a number of rounded ridges are seen on the concave under surface, each being covered with thorny projections, and having between each pair of ridges a variable number of the small thin laminæ.

If we could re-invest this mass of stony plates with the creature that formed them, we should find that there would be nothing but a thin film of gelatinous matter, apparently without any more appearance of a living structure than if it were so much glue washed over the laminæ with a brush.

Yet, if touched, the membranous film will withdraw itself between the laminæ, and not return to its place until some time after the irritating cause has been removed.

Organs it has none—at least none that have as yet been detected. There seem to be no tentacles for inducing currents of water to pass over its surface, no mouths for the admission of food, no digestive organs, no nerves, no muscles.

Still, in some way to us unknown, this shapeless and apparently inorganic film is able to assume a definite form, to separate from the sea water the calcareous particles which are floating in it, and to build them up into a beautifully elaborate arrangement.

> "The unknown abyss
> Of Nature's laboratory, where she hides
> Her deeds from every eye except her Maker's."

It might seem that when once the stony particles were deposited and arranged, they must be out of the control of the creature that separated them from the sea water. But careful investigations have shown that the earthy matter is deposited in the substance of the film, and that its particles can not only be deposited by the animal, but removed as occasion requires, or even absorbed again into the gelatinous film.

There are vast numbers of these fungus-like Madrephylles, another well-known example of which is the common Brain-stone Coral, *Mœandrina*, so called because its convolutions and general shape present a striking resemblance to the human brain when removed from the skull.

Many of the common Madrepores look very much as if a vast number of the mushroom Madrephylles had been moulded into a convex mass, very much diminished in size, and viewed through the pseudoscope, so that each individual appears concave instead of convex.

Those, however, which are the most conspicuously apparent in their submarine office are the beautiful species which are here represented by the Plantain Madrepore (*Madrepora plantaginea*), so common in drawing-room ornaments. These are the formers of the so-called Coral Islands, and in spite of the small size of the living polypes, and the minuteness of the calcareous particles which they deposit, they actually alter the surface of the globe so rapidly that important changes are made within the compass of a single human life-time, and the physical geography of enormous tracts is entirely transformed.

In the first place, it must be understood, that not even the apparently inorganic film of the Madrephylles can exist at any great depth of water, a certain amount of light and warmth being necessary for them. When we come to the better organized beings which produce the true Madrepores, we find that a larger supply of light and warmth is required, and that in consequence they are brought more within the scope of personal observation. Moreover, the water is so translucent in such localities that objects are clearly discernible at a depth of forty or fifty feet.

The whole surface of the Madrepore is covered with polypes of various sizes and colors, furnished with feathery arms that radiate like the petals of a flower, and are perpetually in motion, evidently for the sake of catching food. If touched, the polype contracts itself into the soft, gelatinous film from which it had proceeded, and is only visible as a small and slightly-projecting tubercle. The spot on which each polype has rested is marked in the stony skeleton by being the centre to which all the little laminæ converge.

If these polype-cells be examined with a tolerably powerful lens, a wonderful beauty of structure will be revealed, the little spicules of which the general mass is composed being arranged with a regularity that wonderfully resembles the ice-crystals of the snowflake.

Care must be taken to hold it in a good light, the system on which the structure is based will then be easily seen.

Round the edge of the aperture are ranged in order a vast number of the white stony spicules of which the mass is composed.

Radiating from the circumference toward the centre, but not quite meeting, are six very delicate laminæ. When viewed directly from above, so that only their upper edges are seen, they look very like the spokes of a wheel, and indeed have been so represented in more than one book, the artist having evidently drawn from a microscopical preparation. If, however, we take a piece of the Madrepore in our hands, and turn it about as we are examining it with the lens, we shall find no difficulty in tracing the laminæ down to the extremity of the cell, if we may so call it.

As each of these cells was once inhabited by a living six-armed polype, always keeping its beautiful tentacles in motion, it is easy to imagine the extreme beauty of the object when its living envelope is still encrusting it.

How the Coral Islands are produced must now be seen.

The bed of the ocean is not one uniform plain, but, like the surface of the earth, has its deep valleys and lofty mountains. Sometimes, the tops of the mountains are not covered by water, and then we call them islands; but they are not the Coral islands of which we are now treating.

These appear mysteriously, and give no premonitions of their appearance. A ship, perhaps, passes over the track which has been traced by hundreds of vessels previously, strikes upon a rock that is not in the charts, and sinks. She has come upon a coral island that has not yet reached the surface, but which in a few years will be known, and its place noted in the charts.

Below the surface is the apex of a mountain-peak, submerged so deeply that a ship cannot touch it with her keel. But upon that peak the Coral colonies have settled, and have continued their hidden work until their sharp, stony ridges have gradually approached the surface and become a danger to the next vessel that sails in that direction.

By degrees, the Coral reaches the limits of high water, and the polypes which make it not being able to exist without water, can rise no higher, but spread laterally in all directions, until, according to Captain Basil Hall's graphic simile, it looks like a huge cauliflower on its stem. Conse-

quently, there is deep water within a foot of its edge, the lead gives no warning, and so a vessel is wrecked without any fault of those in charge of her.

Another well-known form of Coral Island is that which forms a large circle. There is deep water close to the edge both inside and outside, forming a natural harbor, so perfect that although a tempest may rage outside it, there is smooth water within. This is also due to a submarine mountain.

In those regions volcanic action is a conspicuous element, and volcanoes, both active and extinct, are plentiful. When an extinct volcano rears its summit tolerably near the surface of the sea, the Coral-makers are sure to settle upon it sooner or later. As the Coral must necessarily be founded on the edge of the crater, it is evident that when it reaches the surface of the water it must retain the circular form. The Coral, not being able to extend itself upwards, in consequence being almost invisible by day, and quite so at night, both these types of Coral Islands would become exceedingly dangerous, and, indeed, make navigation almost impossible. But another provision steps in, and not only robs them of their terrors, but converts them into havens of rest and safety.

Before very long, seaweeds accumulate, and are flung by the storms upon the surface of the "reef," as the Coral mass is called. Mixed with the seaweed are quantities of marine worms, molluscs, and other specimens of ocean life. Being unable to exist out of the water, they die, and by their decay form a fertile earth capable of affording nourishment to plants of a higher order.

Floating cocoa-nuts, which have the power of drifting for immense distances while retaining the principle of life, are arrested by the new reef, strike root and become the progenitors of palm-trees innumerable. Birds are sure to follow, bringing with them the seeds of various plants, and so by degrees the almost invisible coral reef becomes a fertile island.

Man then visits the newly-found region, attracted by the waving palm-trees, and finds a spot exactly suited to his wants. The natives of these climates are essentially maritime, and nothing better for them could be imagined than this palm-fringed ring of fertile land resting upon its coral base. In its centre is an absolutely perfect harbor, affording refuge for their canoes in stormy weather. The harbor is, in fact, the crater of the submerged volcano, so that whether within or without, the vessels can be brought so close to the shore that the tops of the cocoa-palms actually overhang the masts of the canoes.

Food is to be found in abundance. As to vegetable food, there are, in the first place, the cocoa-nut palms, each of which trees can afford subsistence to a family. Then there are sure to be bread-fruits, yams, pine-apples, mangoes, and the other vegetable productions which thrive so abundantly in tropical regions.

Animal food is found in abundance in the sea. Fishes come for shelter in the coral-reefs, and absolutely swarm under the overhanging ledges of rock. The interior of the island is also full of them, the central lake, with its quiet waters being precisely what the fishes most need, and becoming a vast natural fish-hatching establishment.

Cuttles, which are largely eaten by the natives, also hide in the rocky crevices, and are deluded to their destruction by cunningly devised baits made of cowrie-shells. The turtles also abound in these seas, and when the time comes for depositing their eggs, haunt the shore in search of convenient nurseries.

So, by the unseen and unheard labors of the Coral-makers, the earthy particles which were entangled in the water are separated and built into a form suitable for the habitation of Man, thus giving him more earth to replenish and subdue, and enabling him to fulfil more completely the mission for which he was created.

Having now glanced at the most conspicuous achievements of the Corals, we will take a hasty review of some of the endlessly varied forms which they assume.

There are the various Caryophylle Madrepores, specimens of which are favorite inhabitants of marine aquaria, the lovely colors of their animal envelope being even more attractive to the eye than the delicate stony lamina which they deposit. Several species are found on our own southern coasts. The reader must imagine to himself that the groundwork of this beautiful object is pure dead white, and that the upper portion is colored with crimson, yellow, "eau-de-Nile" green, pale grey, and other hues, no two specimens being exactly of the same color.

Then there are the true Corals of commerce, sometimes white, sometimes red, sometimes pink, the last mentioned being of the most value in the manufacture of ornaments.

All the true Corals have the stony core, solid and branch-like, and slightly grooved on the exterior. At irregular intervals there are small rounded projections, radiated in star-like fashion above. These mark the spots in which the living polypes were placed, the remainder being covered with the common gelatinous envelope to which they are attached, or rather from which they proceed. If a transverse section be made of a branch of Coral, it will be seen to have some resemblance to the porcupine quill, or the spine of the sea-urchin, the lines of the corrugated surface being continued inwards until they nearly meet in the center.

The polypes stand out boldly from the general mass, each one with its eight fringed tentacles fully extended for the capture of food. Just on its right is a half-extended polype, and below is one which is just beginning to protrude its arms. The rounded projections, with their star-like radiations show the position of other polypes which have withdrawn themselves into the general envelope.

As in the common red Coral the general envelope is scarlet, and the polypes are snowy white, the extreme beauty of the living creatures can be easily imagined.

The whole life-history of the Coral is singularly interesting, dating from the day when it swims freely through the water in search of a favorable locality, to the time when it has settled down and developed into the beautiful branched structure with which we are so familiar. But it is beyond the scope of this present article, and we most reluctantly pass it by.

In the true Corals the branches are short, stout, and sturdy, and therefore capable of sustaining the force of the waves. But there are some allied species which have very long and slender branches, which would be broken to pieces by a wave which has no effect on the true Coral. On account of the tangled mode in which the branches of these beings are interlaced they are called Gorgonias by the scientific. Fishermen mostly know them by the name of Sea Fans, or Fan Corals, because they are flat and spread in fan-fashion from the base. In some of them the animal envelope is a bright scarlet, and retains its color after it is dry, so that a good specimen of Gorgonia is really a handsome object.

The spicules which are deposited by the animal are wonderful objects when seen under a moderate microscopical power, say a half-inch object-glass. They are transparent, stick-shaped, covered with knobs, and having the most lovely tints of pink, very pale blue, and yellow. Indeed, they look so much like barley-sugar that all young people to whom I have shown the spicules through the microscope have said that they *must* be good to eat, if they were only large enough.

In all these curious beings the central axis of the stem and branches is composed alternately of horny matter and

stone, the former producing flexibility, and the latter giving strength. When beaten by the waves this compound structure yields to their force, and is enabled to recover itself again when the force of the storm has passed away.

Another beautiful and well-known example of this group is the Organ-pipe Coral, of which there are several kinds. The color of the tubes is pinky red, and as the animal that deposits it is bright green, the appearance of a living specimen is singularly beautiful.

These tubes radiate slightly from each other, though they can scarcely be said to have a common center. They are supported at intervals by horizontal laminæ, through which they pass, so that they bear a resemblance to the arrangement of organ pipes too evident to be unnoticed.

Now and then they envelope a stone, shell, or other foreign object, and in such cases have a curious way of turning aside for a space, and resuming their original course when they have passed round the obstruction.

In all the species belonging to this group, the polypes, instead of being on the outside of the stony deposit, are within it, forming it into tubes, in and out of which they can freely project the tentacle by which they obtain food.

These beings enter largely into the constituents of Coral Islands, and occur most numerously within the tropics. They are, however, found in most of the warmer seas, either north or south of the equator, and are very plentiful in the Red Sea.

How these tubes and their supporting laminæ are produced no one as yet knows. It seems that there *must* be vessels or secreting sacs, but none have as yet been found. How the creature is able to protrude and retract itself, spread or fold its tentacles, is another mystery. There are no perceptible muscular fibres, still less any nerves, by which the will of the animal—for it evidently has a will—can be conveyed to them. We do know that the membrane is capable of contraction and relaxation, but there our knowledge ceases.

The last of these wonderful beings that can be mentioned is the Sea Pen.

These remarkable compound animals are not attached to any object which could support them, but seem to lie loosely at the mercy of the waves. They are all more or less phosphorescent, and at night have a peculiarly striking appearance, owing to their graceful and boldly curved outlines. The Sea Pens are to be found in nearly all the warmer seas, and are common in the Mediterranean.

NEIGHBORS.

If we're cowards about trouble,
  Looking round which way to run,
We shall make our trouble double;
  There is something to be done.

There is always some one doing,
  Something he has found to do,
Working at some work, renewing
  His own heart, and others' too.

We may ever learn from others,
  When we've lost our head or heart,
How to help our fallen brothers,
  How to act a neighbor's part.

Yet we still shall shrink from braving
  Shame and wrong and pain and loss,
Till we learn there is no saving
  Life or lives, without a cross.

We must share the great salvation—
  Dying, in our Savior's death,
Rising, in the new creation,
  Living, with immortal breath.

Then, we joy in tribulations,
  Join in work the martyr throng,
As they toil amongst the nations,
  Turning trouble into song.

D

THE CATACOMBS OF ROME.*

PART I.

"When I was a boy attending school at Rome," says one of the early Christian Fathers, the monk Jerome, "I used often, with others of my own age and tastes, to visit the sepulchres of the apostles and martyrs, dug in the very heart of the earth. The walls on either side are lined with graves, and here and there light is let in to mitigate the gloom. As we advance, the words of the poet are brought to mind: 'Horror on all sides; the very silence fills the soul with dread.'"

This description of the catacombs in the fourth century is equally applicable to their appearance in the nineteenth. Their main features are unchanged, although time and decay have greatly impaired their structure and defaced their beauty. These Christian cemeteries are situated chiefly near the great roads leading from the city of Rome, for the most part within a circle of three miles from the walls. The openings of the catacombs are scattered over the desolate campagna; often amid the mouldering monuments that rise, like stranded wrecks, above the rolling sea of verdure of the tomb-abounding plain. On every side are tombs—tombs above and tombs below—the graves of contending races, the sepulchres of vanished generations.

How marvelous that beneath the remains of a proud pagan civilization exist the early monuments of that power before which the myths of paganism faded away, as the spectres of darkness before the rising sun. Beneath the ruined palaces and villas, the crumbling tombs and temples of the august mistress of the world, we find the most interesting relics of early Christianity on the face of the earth. In traversing these tangled labyrinths we are brought face to face with the primitive ages; we are present at the worship of the infant Church; we observe its rites; we study its institutions; we witness the deep emotions of the first believers as they commit their dead—often their *martyred* dead—to their last long resting place; we decipher the touching record of their sorrow, of the holy hopes by which they were sustained, of their "faith triumphant o'er their fears," and of their firm assurance of the resurrection of the dead and of the life everlasting.

We read, in the testimony of the catacombs, the confession of faith of the early Christians; sometimes accompanied by the records of their persecution, the symbols of their martyrdom, and even the very instruments of their torture. For, in these halls of silence and gloom slumbers the dust of many of the martyrs and confessors who sealed their testimony with their blood during the sanguinary ages of persecution; of many of the early bishops and pastors of the Church, who shepherded the flock of Christ amid the dangers of those troublous times; of many who heard the words of life from teachers living in or near the apostolic age, perhaps from the lips of the apostles themselves. Indeed, if we would accept ancient tradition, we would believe that the bodies of St. Peter and St. Paul were laid to rest in those hallowed crypts—a true "holy ground," inferior in sacred interest only to that rock-hewn sepulchre consecrated evermore by the body of our Lord. These reflections will lend to the study of the catacombs an interest of the highest and intensest character.

It is impossible to discover with exactness the extent of this vast necropolis, on account of the number and intricacy of its tangled passages. That extent has been greatly exaggerated, however, by the monks who guide visitors through their labyrinths. They have said, for instance, that there are sixty separate catacombs, and that the entire length of their

*A lecture delivered August 19, 1881, in the Amphitheatre at Chautauqua.

passages is nine hundred miles. There are, in fact, only forty-two in all now known, and from a careful survey of part, it is computed that the aggregate length of their passages is five hundred and eighty-seven geographical miles—equal to the entire extent of Italy from Ætna's fires to Alpine snows.

The entrance to the abandoned catacomb is sometimes a low-browed aperture, like a fox's burrow, almost concealed by long and tangled grass, and overshadowed by the melancholy cypress or gray-leaved ilex. Sometimes an ancient arch can be discovered, or the remains of a church or of a chamber for celebrating the festivals of the martyrs.

In all cases there is a stairway, often long and steep, crumbling with time and worn with the feet of pious generations.

The catacombs are excavated in the volcanic rock which abounds in the neighborhood of Rome. It is of a coarse, loose texture, easily cut with a knife, and bearing still the marks of the mattocks with which it was dug. They consist essentially of two parts—corridors and chambers, or *cubicula*. The former are long, narrow and intricate passages, forming a complete underground network. They are for the most part straight, and intersected by others at approximate right angles.

The main corridors vary from three to five feet in width, but the side passages are much narrower, often giving room for but one person to pass. They will average about eight feet in height, and are generally vaulted, though sometimes flat. The walls are, for the most part, of the naked rock, but are sometimes plastered and occasionally strengthened with masonry. At the corners of these passages are frequently niches in which lamps were placed, without which, indeed, they must have been an impenetrable labyrinth. A touching legend is recounted of a young girl who was employed as a guide to the places of worship in the catacombs because, *on account of her blindness*, their sombre avenues were as familiar to her accustomed feet as the streets of Rome to others.

Both sides of the corridors are thickly lined with *loculi*, or graves, which have somewhat the appearance of berths in a ship, or of the shelves in a grocer's shop; but the contents are the bones and ashes of the dead, and for labels we have their epitaphs. They are of all sizes: from that of the infant of an hour to that of an adult man. But here, as in every place of burial, the vast preponderance of children's graves is striking. How many blighted buds there are for every full blown flower, or ripened fruit!

It is difficult, if not impossible, to compute the number of graves in these vast cemeteries. Some 70,000 have been counted, but they are a mere fraction of the whole, as only a small part has been fully explored. Father Marchi computed the entire number to be 7,000,000. The more accurate estimate of De Rossi reduces the number to nearly 4,000,000. Even this seems almost incredible, but we know that for at least 300 years, or for ten generations, the entire Christian population of Rome was buried here, and that population, even at an early period, was of considerable size. In the time of persecution, too, the Christians were hurried to the tomb in crowds. In this silent city of the dead, we are surrounded by "a mighty cloud of witnesses," "a multitude which no man can number," whose names, unrecorded on earth, are written in the Book of Life. For every one who walks the streets of Rome to-day are hundreds of its former inhabitants calmly sleeping in this vast encampment of death around its walls—"Each in his narrow cell forever laid;" "Till the archangel awake them they slumber."

These graves were once all hermetically sealed by slabs of marble, or tiles of *terra cotta*, or baked clay. The slabs were generally of one piece, which fitted into a groove or mortice cut in the rock, and were firmly cemented to their places. The tiles were generally smaller, two or three being required for an adult grave. They were arranged in panels and were cemented with plaster, on which, while soft, a name or symbol was often rudely scratched with a trowel. Most of these slabs and tiles have disappeared, and many of the graves have long been rifled of their tenants. In others may still be seen the mouldering remains of what was once man in his strength, woman in her beauty, or childhood in its innocence and glee. If these bones be touched they will generally crumble into a white flaky powder, which sometimes retains the outline of the human form. Verily, we are but dust and ashes.

The other essential constituent of the catacombs, besides the galleries of which I have spoken, consists of the *cubicula*. These are chambers hewn out of the rock on either side of the galleries, generally opposite each other. They often bear the character of family vaults, and are lined with graves like the corridors without. They were probably used as chapels for the holding of funeral services, and for observing the religious festivals of the martyrs. They are too small to have been used for regular worship, except, perhaps, in time of persecution, being only from eight or ten feet square to twenty feet square, though sometimes four or five were united, so as to accommodate an audience of over a hundred. It is thought that their construction in pairs was designed for the separation of the sexes in worship.

The floor was frequently paved with tiles or mosaic. The walls were often plastered and beautifully frescoed, as was also the vaulted ceiling.

I have as yet spoken of only one level of the catacombs. But frequently "beneath this deep there is a lower deep," or even three or four tiers of galleries, excavated as the upper ones became filled with graves, and separated by thick strata of rock.

Access to these different stories is gained by stairways. The awful silence and almost palpable darkness of these deepest dungeons, which are nearly 100 feet below ground, are absolutely appalling. Here death reigns supreme. Not even a lizard or a bat dwells in this eternal gloom. Naught but skulls and skeletons, dust and ashes are on every side. The air is dense and deadly, and difficult to breathe. "The cursed dew of the dungeon's damp" distills from the walls, and a sense of oppression, like the patriarch's "horror of great darkness," broods over the scene.

The catacombs were ventilated and partially lighted by numerous openings, variously called *spiragli*, or breathing-holes, and *luminari* or light-holes. While but a few faint rays struggled to the lowest depths, many of the upper chambers were well lighted. The brilliant Italian sunshine to-day lights up the pictured figures on the wall, as it must have illumined the fair brow of the Christian maiden, the silvery hair of the venerable pastor, or the calm face of the holy dead waiting for interment, in those early centuries so long ago.

The more technical description of the catacombs, however, gives no conception of the thrilling interest felt in traversing their long-drawn corridors and vaulted halls.

One's footsteps echo strangely down the distant passages and hollow vaults, dying gradually away in the solemn stillness of this valley of the shadow of death. The graves yawn wierdly as he passes, torch in hand. Deep, mysterious shadows crouch around, and unfleshed skeletons seem to stretch their bony hands, as if to arrest his progress.

Almost appalling is the sudden transition from the busy city of the living to the silent city of the dead—from the golden glory of the Italian sunlight to the funereal gloom of these sombre vaults. The sacred influence of the place subdues the soul to tender emotions. The fading pictures on the walls, and the pious epitaphs of the departed, breathe on every side an atmosphere of faith and hope; and awaken

a sense of spiritual kinship, that overleaps the intervening centuries. We speak with bated breath, and thought is busy with the past.

"It seems as if we had the sleepers known."

We see the mother, the while her heart is wrung with anguish, laying on its stony bed—rude couch for such a tender thing—the little babe torn from her fond embrace; the husband bearing to its final rest the pulseless form of the loved wife of his youth, and the widow weeping, broken hearted, because the strong arm on which she so long had leaned is forever palsied in death. We behold the persecuted flock following, it may be, the mangled remains of the faithful pastor and valiant martyr for the truth, which, at the risk of their lives, they have stealthily gathered at dead of night. With holy hymns broken by their sobs, they commit his mutilated body to the grave, where, after life's long toil he sleepeth well. We hear the Christian chant, the funeral plaint, the pleading tones of prayer, the words of holy consolation and of lofty hope with which the dead in Christ are laid to rest. Perchance those sacred sounds stealing through the distant corridors may have fallen with strange awe on the souls of the rude soldiery, stealthily approaching their prey, and perhaps not unfrequently with saving and sanctifying power. But sometimes, tracked by the sleuth-hounds of persecution, or betrayed by some wretched apostate, the Christians were surprised at their devotions, and their refuge became their sepulchre. Such was the tragic fate of St. Stephen, one of the early bishops, slain even while ministering at the altar, and sprinkling with his blood the sacred table; such the event described by Gregory of Tours, when a hecatomb of victims were immolated at once by heathen hate; such the peril which wrung from a stricken heart, the cry, not of anger, but of grief, recorded on a tomb; "O sad times, in which, among sacred rites and prayers, even in caverns we are not safe."

The Christians in time of persecution, walled up the principal passages of the catacombs, and made secret stairways and other means of escape into the adjacent sand pits, and to the surface of the ground.

It requires no great effort of imagination to conceive the perils and "hair breadth 'scapes," which must have been frequent episodes in the heroic lives of the early soldiers of the cross. With what emotions must they have held their solemn worship and heard the words of life, surrounded by the dead in Christ! With what power would come the promise of the resurrection of the body amid the crumbling relics of mortality! How fervent their prayers for their companions in tribulation, when they themselves stood in jeopardy every hour! They won, ofttimes, amid the crackling of fagots and the roar of the flames, not a crown of laurel or of bay, but a crown of life, starry and unwithering, that can never pass away. Their humble graves are grander monuments than the trophied tombs of Rome's proud conquerors upon the Appian way. Lightly may we tread beside their ashes. Reverently may we mention their names.

"Brave were the sleepers all, living and dying."

Catching the glow of their intrepid spirits, we exclaim: O, death, where is thy sting? O, grave, where is thy victory?

The exploration of the catacombs, it may be easily conceived, is not unattended with danger. Several persons have lost their lives in their mysterious depths. As late as 1837 a party of some thirty Roman students entered their gloomy crypts, and were never heard of again. Less tragical in its issue is the exciting event thus described by the Abbe de Lille:

Eager to know the secrets of the place,
(The holy cradle of our Christian race)
A youthful artist threads those inmost cells,
And lowest crypts, where darkness ever dwells.
No friend to cheer him, and no guide to lead,
He boldly trusts a flambeau and a thread.
Brave and alone he cherishes his light,
And trusts the clew will guide him back aright.
Onward he goes along the low arched caves,
Crowded with martyrs' relics and their graves;
Through palaces of death, by countless tombs,
Through awful silence, and through thickening glooms.
Onward he goes, nor takes a note of time,
Impelled, enchanted in this dismal clime;
Thrilling with awe, but yet untouched by fear,
He passes on from dreary unto drear!
The crypts diverge, the labyrinths are crossed,
He will return—alas! his clew is lost!
Dropped from his hand while tracing out an urn.
The faithless string is gone, and faintly burn
The flambeau's threads. He gropes, but gropes in vain,
Recedes, advances, and turns back again;
He halts, he moves, he thinks, he rushes on,
But only finds that issue there is none.
He prays, he vows, he shouts, he calls,
And echo answers from a hundred walls.
Cold at his heart! his breath now quick, now slow,
Sounds in that silence like a wail of woe!

And now his torch's light
Flickers, expires in smoke, and all is night.
Thick coming fancies trouble all his sense,
He strives, but vainly strives, to drive them thence;
That dying torch last shone upon a grave,
That grave *his* tomb, for who shall help and save?
Alone! yet *not* alone, for phantoms throng
His burning brain, and glide the crypts along.
But hark! a step! alas, no step is there!
But see! a glimmering light! O foul despair!
He staggers, reels, and falls, and falling prone,
Grapples the ground where he must die alone.
But as he falls what touches now his hand?
It is, O joy! it is the precious strand
Of the lost clew. He quick upstarts, and, cautious grown,
He threads the mazes by that string alone.
Reaches the light, and feels the fanning breeze,
Sees the bright stars, and drops upon his knees;
And never Tiber, rippling through the meads,
Made music half so sweet among its reeds:
And never had the earth such sweet perfume,
As when it chased the odor of the tomb.

When Christianity, under the protection of the emperor Constantine, came forth in triumph from the catacombs, subterannean interment fell gradually into disuse. With the incursions of the northern barbarians, and the breaking up of the Roman empire, these ancient sanctuaries of the faith became forgotten, and for nearly 1000 years their very existence was practically unknown. In the year 1578 some laborers digging in a vineyard discovered by accident one of these cemeteries of the primitive church. The event caused a profound sensation, and successive adventurers have been attracted by the fascination of the task to the exploration of this great whispering gallery of the past. Bosio spent five and thirty years in this work. D'Agincourt came to Rome intending to spend six months in the task, but it so grew upon him that it occupied the remaining fifty years of his life. The most thorough and costly exploration was that undertaken by the French government at an expense of 180,000 francs, by means of an organized corps of scholars, artists, and engineers. The result is a magnificent work in seven huge folio volumes, which costs about $600. The most important discoveries, however, are those of De Rossi, during the last ten or fifteen years.

I must now say a few words upon the art and symbolism of the catacombs.

The paintings of these ancient crypts give evidence that art was not, as has been asserted, entirely abjured by the primitive believers, on account of its idolatrous employment by the pagans, but was baptized into the service of Chris-

tianity. The very intensity of that old Christian life, under repression and persecution, created a more imperious necessity for a religious symbolism. Of those unknown artists it may truly be said:

They never moved their hand
Till they had steeped their inmost soul in prayer.

A universal instinct leads us to beautify the sepulchres of our departed. It is not, therefore, remarkable that the primitive Christians adorned, with religious expression of their faith and hope, the graves of the dead, or traced upon the martyr's tomb the palm and crown, the emblems of victory, or the dove and olive branch, the perpetual symbol of peace. This symbolism is generally of a profound spiritual significance, and often of extreme poetic beauty. In perpetual canticle of love it finds resemblances of the Divine object of its devotion throughout all nature. The rudely drawn figure of an anchor, the symbol of that hope which is the anchor of the soul, is one which most frequently occurs. Associated with this in thought, is the symbol of a ship, the emblem of the soul's abundant entrance into the haven of everlasting rest. It is often extremely rude, being evidently copied from the clumsy barges that navigated the neighboring Tiber. The palm branch and the crown often occur, emblems of the Christian's victory over the world, and of his crown of everlasting life. One of the most beautiful of these symbols is the dove, generally with the olive branch in its mouth—"the herald of the peace of God"—frequently accompanied by the word *pax*, or peace.

Another very common symbol is that of Christ as the Good Shepherd and believers as sheep and lambs, calling up the thought of that sweet Hebrew idyl, the xxiii. Ps., and of our Lord's tender parable of the lost sheep. Small wonder that it was a favorite subject of the ancient Christian artists. Over and over again is the sweet story repeated, making the gloomy crypts bright with soft pastoral scenes, and hallowed with sacred associations. Frequently some of the sheep are represented as listening earnestly, others are intent on cropping the herbage, a truant ram turns heedlessly away, and often a gentle ewe nestles fondly at the shepherd's feet, types of different dispositions of soul and of the manner of hearing the Word.

One of the most remarkable of these symbols was the fish. It derived its peculiar significance from the fact that the initial letters of the name and title of our Lord—Jesus Christ, Son of God the Savior—make up the Greek word ΙΧΘΥΣ, or fish. Hence, the fish was to the Christian a secret symbol of faith in Christ, which to the pagan would be devoid of meaning. It was, therefore, used in time of persecution as a sign of recognition among believers, like the signs of Free Masonry. It is remarkable, and in striking contrast to modern Romanism, that the figure of the cross so seldom occurs in the catacombs, and then only as a modification of the sacred monogram, or combination of the first two letters of the name of Christ, Χ and Ρ written together, sometimes with the Greek letters Α and Ω, in allusion to the sublime passage in Revelation, 1: 8.

[CONCLUSION IN DECEMBER NUMBER.]

A COMPARISON.

Sweet stream, that winds through yonder glade,
Apt emblem of a virtuous maid!
Silent and chaste she steals along,
Far from the world's gay busy throng,
With gentle yet prevailing force,
Intent upon her destined course;
Graceful and useful all she does,
Blessing and blessed where'er she goes;
Pure-bosomed as that watery glass,
And heaven reflected in her face!

ARCHERY.

"But, Eckermann," said Frau von Goethe, "at a tea-party in the park, you are in the open air, and quite in your element." "On the contrary," said I, "when I am so near nature, that I scent all her fragrance, and yet cannot thoroughly enjoy it, it is to me as unendurable as it would be to a duck to be brought near to the water, and yet prevented from plunging into it." "You might say, too," remarked Goethe, laughing, "that you would feel like a horse who, on raising his head in the stable, sees other horses running wild upon an extensive plain before his eyes. He scents the delights and freedom of fresh nature, but cannot partake of them. Let Eckermann alone; he is as he is, and you cannot alter him. But tell me, my good friend, how do you employ yourself with that Doolan of yours, in the open fields, these long fine afternoons?" "We look out for some retired grove," said I, "and shoot with bows and arrows." "Humph!" said Goethe, "that may be a pretty amusement." "It is a glorious method," said I, "to get rid of the ills of winter." "But how in the world," said Goethe, "did you get bows and arrows here in Weimar?" "As for the arrows," returned I, "I brought a model with me, on my return from my expedition into Brabant in 1814. Shooting with bows and arrows is there universal. There is no town, however small, that has not an archery society. They take their station in some public-house, like our skittle-ground, and generally assemble late in the afternoon, when I have often watched them with great pleasure. What well-grown men were there, and what picturesque attitudes when they bent the bow! How was their strength displayed, and what excellent marksmen they were! They generally shot from a distance of sixty or eighty steps, at a paper mark upon a moist clay wall; they shot quickly one after another, and left the arrows sticking in. And it was not seldom that out of fifteen arrows five struck the centre, which was about the size of a dollar, while the rest were very near it. When all had shot, each went and drew his arrow out of the soft wall, and the game went on afresh. I was then so enraptured with this archery, that I thought it would be a great thing to introduce it into Germany, and I was so stupid as to deem it possible. I often bargained for a bow, but there were none to be had under twenty francs, and how could a poor Jäger like myself scrape together so much money? I therefore confined myself to an arrow, as the most important and most elaborate article; and bought one at a manufactory at Brussels for a franc, which I brought home, together with a drawing, as my only prize of victory."

"That is just like you," said Goethe. "But do not think that you can make anything natural and beautiful popular. A long time, and a confounded deal of work, will be requisite, at any rate. But I can easily imagine that this Brabant archery is very beautiful. Our German amusements in the skittle-ground appear rough and ordinary, in comparison with it, and savor strongly of the Philistine."*

"The beauty of archery," returned I, "is that it displays the body symmetrically, and exercises the powers in equal proportion. There is the left arm which holds the bow, stiff, strong, and firm; there is the right which draws the string with the arrow, and must be no less powerful. At the same time both the feet and the thighs are planted strongly, to form a firm basis for the upper part of the body. The eye directed to the aim, and the muscles of the neck are all in full tension and activity; and then the feeling of joy, when the arrow darts whizzing from the bow, and pierces the desired mark! I know no bodily exercise that can be at all compared to it."

* "Philister," the academical slang corresponding to the English "snob."—*Trans.*

"It would be very well suited to our gymnastic institutions," answered Goethe. "And I should not wonder if, in twenty years, we were to have skillful archers by the thousands in Germany. Generally speaking, much is not to be done with a full-grown generation, in physical or in mental pursuits, in matters of taste or of character. Be clever enough to begin with the schools, and you may succeed."

"But our German teachers of gymnastics," returned I, "do not understand the use of bows and arrows."

"Well," said Goethe, "several gymnastic societies might combine, and a skillful archer might be brought from Flanders or Brabant. Or they might send some fine well-grown young gymnasts to Brabant, that they might be trained to good archers, and learn how to carve bows and make arrows. These young men might enter the German gymnastic institutions as traveling teachers, who would sojourn for a time, now with one society, and now with another.

"I have," continued Goethe, "no objection to German gymnastic exercises. On the contrary, I was sorry that so much politics crept into them, so that the authorities were obliged to restrain them, or even to forbid and abolish them. By this means we have thrown away the good for the bad.* But I hope that the gymnastic institutions will be revived; for our German youths need them, especially the students, who, with a great deal of mental and intellectual exertion, are without any physical equilibrium, and therefore without any necessary power of action. But tell me something more about your bow and arrow. Then you have really brought an arrow with you from Brabant? I should like to see it."

"It has been lost long ago," returned I. "I remembered it so well, that I succeeded in replacing it, and indeed by a dozen instead of one. It was not, however, so easy as I expected, and I made many fruitless attempts and many failures, but by that very means I learned a great deal. The first thing to be attended to was the shaft; I had to see that it was straight, and would not warp in a short time; then that it was light and strong enough not to split in striking against a hard substance. I made experiments with the wood of the poplar, then of the pine, and then of the birch; but they were all deficient in one quality or another, and were not such as they ought to be. I then made experiments with the wood of the lime-tree from a slender straight stem, and I found exactly what I wished for and had sought. Such a shaft was light, straight, and strong, on account of its fine fibres. The next thing to be done was to furnish the lower end with a tip of horn; but it soon became evident that all horn was not fit for the purpose, and that it must be cut out of the kernel, in order that it might not split on being shot against any hard substance. But the most difficult part was yet to do, namely, the feathering of the arrow. How I bungled, and what failures I made, before I succeeded in bringing it to any perfection !"

"The feathers are not let into the shaft, but glued on, are they not ?" said Goethe.

"They are glued on," returned I; "but this must be so strongly and so neatly done, that they shall appear as if they were a part of the shaft, and had grown out of it. It is not a matter of indifference what glue one uses. I have found that isinglass, steeped in water for some hours, and then with some spirit added, dissolved to a jelly over a gentle charcoal fire, makes the best glue. Neither are all feathers serviceable alike. The feathers drawn from the wings of all great birds are indeed good, but I have found the red feathers from the wings of the peacock, the large feathers of the turkey-cock, and particularly the strong and splendid ones of the eagle and bustard, the best of any."

* Literally "thrown away the child with the bath" (das Kind mit dem Bade verschüttet)—a German proverbial expression.—*Trans.*

"I hear all this with great interest," said Goethe. "One who did not know you, would scarcely believe that your tendencies were so lively. But tell me now, how came you by a bow ?"

"I made some myself," returned I. "But here also I bungled dreadfully at first. I consulted cabinet-makers and cartwrights. I tried all the kinds of wood in this place, and at last arrived at excellent results. In the choice of woods, I had to take care that the bow should bend easily, that it should spring back strongly and quickly, and that its elasticity should last. I made my first experiment with ash, with a branchless stem of about ten years' growth, and of the thickness of a moderate-sized arm. But in working, I came to the heart, which was not good for my purpose, as the wood about it was of too coarse a grain. I was advised to take a stem which would be strong enough to *schlachten* into four parts."

"*Schlachten*," asked Goethe, "what is that?"

"It is a technical term used by cartwrights," returned I, "and means the same as *spalten* (to split), so that a wedge is driven quite through the stem, from one end to the other. Now, if the stem grows straight, I mean if the fibres rise in a straight line, the pieces obtained by splitting will be straight and fit for a bow. But if the stem be curved, the pieces will have a curved, crooked direction, and be unfit for a bow, since the wedge follows the fibres."

"But what would be the result of *sawing* such a stem into four parts? One could thus obtain straight pieces in every case."

"One might," returned I, "cut through a stem in which the fibres were twisted, and this would make the parts of no use for a bow.

"I understand," said Goethe; "a bow in which the fibres were cut through would break. But go on further; this subject interests me."

"I therefore made," said I, "my second bow with a piece of split ash. There were no fibres divided at the back, the bow was strong and firm; but I discovered this fault, that it was hard, instead of easy to bend." 'You have taken a piece of seedling ash,' said the cartwright, 'which is always a very stiff wood; but take one of the tough sort, and you will find it better.' On this occasion I learned that there is a great difference in ash, and that, in all kinds of wood, a great deal depends upon the place and soil on which they grow. I learned that the wood of the Ettersberg is of little value as timber; that, on the contrary, the wood in the neighborhood of Nohra possesses remarkable strength, on account of which the carriers of Weimar have great confidence in the cart-fittings made at Nohra. In my subsequent experiments I made the discovery that all wood which grows upon the northern side of a declivity is stronger, and of more even fibres than that which grows on the southern side. This is comprehensible. For a young tree which grows on the shady north side of a cliff, must seek light and sun from above; on which account, longing for the sun, it continually struggles upwards, and draws the fibres in a perpendicular direction. Besides, a shady situation is favorable to the formation of a finer fibre, which is very strikingly apparent in those trees which grow in such a situation, that their south side is constantly exposed to the sun, while their north side is always in the shade. If such a stem lay sawn in pieces before us, we should remark that the point of the heart was by no means in the centre, but very much on one side. And this eccentricity of the heart arises from the circumstance that the yearly rings of the south side become, through the constant influence of the sun, developed more strongly, and are therefore broader than those on the shady north side. Hence cabinet-makers and cartwrights, when they require a strong fine wood, choose in preference the more finely developed north side of

a stem, which they call the winter side, and in which they have great confidence."

"You can imagine," said Goethe, "that your observations are very interesting to me, who have, for half my life, occupied myself with the growth of plants and trees. But continue your relation. You probably made then a bow from a tough ash?"

"I did so," returned I, "and I took a well split piece from the winter side, in which I found a tolerably fine fibre. The bow was also easy to bend, and very elastic. But after it had been in use some months, a very considerable curve showed itself, and it was evident that the elasticity did not continue. I then made experiments with the stem of a young oak, which was moreover a perfectly good wood; but I soon found the same fault in this. I then tried the stem of a walnut tree, which was better; and at last the stem of a fine-leafed maple—a *Masholder*, as it is called, which was the best, and which left nothing to desire."

"I know the wood," returned Goethe; "it is often found in hedges. I can imagine that it is good. But I have seldom found a young stem without knots; and to make a bow, do you not require wood quite free from them?"

"A young stem," returned I, "is indeed not without knots; but when one rears it to a tree, the knots are taken off, or if it grow in a thicket, they disappear in time of their own accord. Now, if a stem is about two or three inches in diameter when the knots are removed, and if it is allowed to increase yearly, and to form new wood on the outside, at the expiration of fifty or eighty years, the knotty inner part will be encased in about six inches of sound wood, free from knots. Such a stem will present a very smooth exterior; but one cannot tell what imperfections it has within. We shall, therefore, at all events, be safe with a plank sawn from such a stem, if we keep to the outside, and cut a few inches from that piece which is immediately under the bark, that is to say, the *splint* and what follows, as this is always the youngest and toughest wood, and the most suitable for a bow."

"I thought," said Goethe, "that the wood for a bow should not be sawn, but must be split, or as you call it *Geschlachet*."

"Certainly, when it can be split," returned I. "Ash, oak, and walnut may be split, because they are woods of a coarse fibre. But not the *Masholder*. For it is a wood of such a fine interwoven fibre, that it will not divide according to the course of the fibres, but splits quite against the natural grain. The wood of the *Masholder* must therefore be divided with the saw, and that without endangering the strength of the bow."

"Humph! Humph!" said Goethe. "You have acquired considerable knowledge through your bow mania. And it is that lively kind of knowledge which is attained only in a practical way. But that is the advantage of a passionate liking for any pursuit, that it carries one to the very bottom of the subject. Besides, seeking and blundering are good, for it is by seeking and blundering that we learn. And, indeed, one learns not merely the thing itself, but everything connected with it. What should I have known of plants and colors, if my theory had been handed down to me ready made, and I had learned it by heart? But from the very circumstance that I was obliged to seek and find everything for myself, and occasionally to make mistakes, I can say that I know something of both these subjects, and more than stands on paper. But tell me something more about your bow. I have seen some Scotch ones which were quite straight to the point, and others the points of which were curved. Which do you consider the best?"

"I consider," returned I, "that the elasticity is much greater when the ends of the bow are curved backwards. At first I made them straight, because I did not understand how to bend the ends. But, when I had learned how to do it, I bent the ends, and I find that the bow not only has a more beautiful appearance, but also that it acquires more power."

"The curves are made by heat, are they not?" said Goethe.

"Yes; by moist heat," returned I. "When the bow is so far finished that the elasticity is equally distributed, and that it is nowhere stronger or weaker than it ought to be, I place one end of it in boiling water, about six or eight inches deep, and let it boil for about an hour. I then screw this softened end, while it is hot, between two small blocks, the inner surface of which has the form of the curve that I wish to give to my bow. In this state of pressure, I let it remain at least a day and a night, that it may be perfectly dry, and I then proceed with the other end in the same manner. Points so treated are as indestructible as if they had grown in such a curve."

"What do you think?" said Goethe, with a mysterious laugh. "I believe I have something for you which will not be unacceptable. Suppose we went down together, and I were to put a genuine Baschkir bow* in your hands."

"A Baschkir bow!" exclaimed I, full of animation, "and a genuine one?"

"Yes, mad fellow, a genuine one," said Goethe. "Come along." We went down into the garden. Goethe opened the under chamber of a small outhouse, the tables and walls of which appeared crammed with rarities and curiosities of every description. I cast only a transient glance at these treasures; my eyes sought the bow. "Here it is," said Goethe, as he took it from a corner, out of a heap of all sorts of strange implements. "I see it is in the same condition as when it was presented to me in the year 1814, by a Baschkir chief. Now, what do you say?"

I was delighted to hold the precious weapon in my hands. It appeared quite uninjured, and even the string appeared perfectly serviceable. I tried it in my hands, and found that it was still tolerably elastic. "It is a good bow," said I. "The form especially pleases me, and for the future it shall serve me as a model."

"Of what wood is it made, do you think?"

"It is, as you see, so covered with birch bark," replied I, "that very little of the wood is visible, and only the curved ends remain exposed. Even these are so embrowned by time, that one cannot well distinguish what the wood is. At the first glance, it looks like young oak, and then again like nut tree. I think that it is nut tree, or a wood that resembles it. Maple or masholder it is not. It is a wood of coarser fibre; besides, I observe signs of it having been split (*geschlachtet.*)

"Suppose you were to try it now," said Goethe. "Here you have an arrow. But be cautious with the iron point, it may be poisoned."

We went again into the garden, and I bent the bow. "Now, where will you shoot?" said Goethe. "Into the air at first, I think," said I. "Go on, then," said Goethe. I shot up toward the sunny clouds in the blue sky. The arrow supported itself well, then turned round, came whizzing downwards, and stuck into the ground. "Now let me try," said Goethe. I was pleased that he, too, was going to shoot. I gave him the bow, and fetched the arrow.

Goethe placed the notch of the arrow upon the string, and held the bow right, but was some time before he could manage it properly. He now aimed upwards, and drew the string. There he stood like an Apollo, with imperishable youth of soul, although old in body. The arrow only attained a very moderate height, and then fell to the ground. I ran and fetched the arrow. "Once more," said Goethe. He now took aim along the gravel path of the garden. The

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* The Baschkiren are a Tartar race subject to Russia.—*Trans.*

arrow supported itself about thirty paces tolerably well, then fell, and whizzed along upon the ground. Goethe pleased me beyond measure, by thus shooting with the bow and arrow. I thought of the verses—

"Does old age leave me in the lurch?
Am I again a child?"

I brought him back the arrow. He begged me to shoot once in a horizontal direction, and gave me for a mark a spot in the window-shutter of his workroom. I shot. The arrow was not far from the mark; but penetrated so deep into the soft wood that I could not get it out again. "Let it stick there," said Goethe, "it shall serve me for some days as a remembrance of our sport."

We walked up and down the garden, enjoying the fine weather; we then sat upon a bench with our backs against the young leaves of a thick hedge. We spoke about the bow of Ulysses, about the heroes of Homer, then about the Greek tragic poets, and lastly about the widely diffused opinion, that Euripides caused the decline of the Greek drama. Goethe was, by no means, of this opinion.

ON A ROCK-BOUND COAST.

High on the rocky crest above the billows
He sits alone, to dream
Of rush-grown banks and boughs of trailing willows
Shading his native stream.

Ah me! amid the crash of ocean thunder
Against the dark sea crags,
He hears the little brook go rippling under
A screen of reeds and flags.

The sea-gull, soaring o'er these barren ledges,
Utters her wailing cry;
But he can hear the mavis in the hedges
Sing to the summer sky.

Oh, like the exile, ever fondly keeping
Home-thoughts within his breast,
We pine for home, and dream, awake or sleeping,
Of our "dear land of rest:"

That better country, by no billows bounded,
Where never storm shall be;
Sweet in our ears the Father's words have sounded—
"There shall be no more sea."

No sea, no heart-wreck, no tempestuous heaving
Of waves that still increase,
But endless calm with Him, in whom believing,
We have eternal peace.

A SIMILE.

Dear Thomas, did'st thou never pop
Thy head into a tin-man's shop?
There, Thomas, did'st thou ever see
('Tis but by way of simile!)
A squirrel spend his little rage,
In jumping round a rolling cage?
The cage, as either side turned up,
Striking a ring of bells a-top?—
Moved in the orb, pleased with the chimes,
The foolish creature thinks he climbs:
But here or there, turn wood or wire,
He never gets two inches higher.
So fares it with those merry blades,
That frisk it under Pindus' shades.
In noble songs, and lofty odes,
They tread on stars, and talk with Gods;
Still dancing in an airy round,
Still pleased with their own verses' sound;
Brought back, how fast soe'er they go,
Always aspiring, always low.

C. L. S. C. ROUND TABLE.*

DR. VINCENT: Some of the members here present are in the habit of attending local circles; those of you who are, raise your hands. How many here are in the habit of prosecuting your studies alone, without attending local circles? Those who are, raise your hands. There is quite a large minority. What are the advantages of the local circles?

REV. DR. S. J. M. EATON: I think I can mention one very special advantage. While we all feel and know it is a voluntary matter altogether as to whether we attend local circles or not, yet I think we have this advantage, at least it has been so in my observation, that it leads to systematic study. That is to say, it induces those who attend local circles to keep up their studies closely each month. My observation has been this: There are a good many members of the C. L. S. C. in the town I live in that do not attend the local circle, and others that do. Those attending the local circle have always been up with their studies every month, while the others lag behind. They think, I suppose, they can read up when it is more convenient; that to-morrow they will have more time, or next week more time. The result is, unconsciously almost, undesignedly, they fall in the rear, and are behind with their studies. The members of the circle with which I am connected, and it is a very good circle, have kept up with their studies closely for three years, that is, one of the classes, and all the classes have kept up closely every year they have been reading the books. At the close of the year we report everything read carefully. I have looked around at others that I know are as good students as I am, and may be better, not connected with a local circle, and they are not so well up. They are back sometimes two months, sometimes three months, and sometimes a year. The local circle leads to regular and systematic study. I suppose, and know in fact, that there are a great many members of the C. L. S. C. who are not able to attend the local circle, owing to business or other cares. But I think there is this second advantage in attending the local circle, that the reading is more thorough. I do not think there is one of us here to-day who will not hear better and will preach better when we have something to stimulate us. If we commence the studies, say for the month of October, and we know we are going to meet with our local circle in two weeks, we will do more thorough reading and studying than though we were just reading on our own account. Every one who comes to our local circle is supposed to have a knowledge of the things he has been engaged in reading. I know it is so in my own case, that I read more thoroughly, sometimes twice over, and sometimes three times, for the purpose of being sure I have all the items in my mind and ready for the meeting of the circle.

DR. VINCENT: Are there any other advantages?

A VOICE: Association and organization.

A LADY: Mind coming in contact with mind is a very great advantage.

DR. VINCENT: Mental attrition is what you speak of?

A LADY: Yes, mental attrition, and accretion also, for we learn from one another.

A VOICE: It gives the advantage of a large number interested and moving on at the same rate of progress in one line of thought. I find a great many attending our circle, and we have a very good one in Cleveland, who say "we have no time to read, but we are always happy to come in and listen to the essays and hear the discussions of topics

*The second Round Table conference of the C. L. S. C. for 1881, held in the Hall of Philosophy, Chautauqua, Friday, August 5th, at 5 o'clock p. m., Rev. Dr. J. H. Vincent presiding.

connected with the exercises, and we read more or less." It gives tone and direction to the reading and thought of vast numbers of those who do not take the regular course.

A VOICE: It is a great help to the memory.

A VOICE: It stimulates research in other books than the required books, and affords an enlarged opportunity for that research, especially when the meetings are held at the houses of members where they have a large variety of books in their libraries which local circles cannot own.

DR. VINCENT: It leads to systematic study. It leads to thorough study. It promotes association and organization. It tends to stimulate by mental attrition. It encourages those who lag behind. It helps the memory. It stimulates research, and affords larger opportunity by bringing the people in contact with a larger number of books on the same subject. Are there any other advantages?

A VOICE: Many questions arise that the members of the class do not understand, and they have no means of ascertaining the answers for themselves. But by this association, and the discussion of topics suggested, they do find the answers to them, and I have found in our community this result, that it leads to a desire to read in a great many who otherwise would have no disposition to read. They are lead by the example of members of the C. L. S. C., and are brought into the organization. It influences those who have no natural disposition to read, to become associated with the members of the C. L. S. C.

A VOICE: It stimulates ambition.

DR. VINCENT: It is a local power, an example and an incentive.

A VOICE: It brings in more members.

A VOICE: It increases the enthusiasm of the readers.

A VOICE: It is an encouragement to slow readers.

REV. J. O. FOSTER: Our local circle held a circle meeting in the woods and a pic-nic, and enjoyed it hugely.

DR. VINCENT: It promotes a pleasant fraternity. I received a letter from a local circle in Phillipsburg, out in Pennsylvania, where they devoted a day to a picnic in the woods, probably fifteen or twenty of them. They prepared an elaborate programme, and invited the leading men in the village, the lawyer, and the minister and the teachers to make short addresses, and my correspondent tells me that the day was one of the most delightful ever spent in the community. It was a picnic with some ideas in it—a picnic in the highest sense recreative—and I like the picnic idea.

MR. FOSTER: At our picnic we had a big programme, and were duly organized. We had three or four essays, and readings from one of the authors designated as a memorial day. We were really behind in the time, but we were determined to keep the memorial days. We had a very large crowd. The gentleman who owned the land came out, and took part in it, and begged the privilege of paying all the expenses.

DR. VINCENT: Do we see any disadvantages growing out of the local circle? Not the ideal local circle, but the practical local circle. What are the disadvantages?

A VOICE: One of the advantages not given is that many local circles can have courses of lectures which would not be given otherwise.

DR. VINCENT: One of the advantages is, it secures courses of lectures before the community, and before the members of the circle, on scientific and historical themes. Now let us have some of the disadvantages of the local circle as conducted in the average way. Can you think of any? First, the timid are embarrassed.

A VOICE: I should think they were encouraged.

DR. VINCENT: Where the circle is well conducted they would be encouraged. Where it is not well conducted they are likely to be discouraged. The leader says: "Miss—— will you give your opinion on the character of Alexander?" The poor child might tell, under some other circumstances, what she thought of Alexander, but it is an embarrassing place to be put in, there are so many present who know so much more than she does, and the way the leader puts the question she feels as though she were a pupil at school again, and much as she used to feel when at school, and she is embarrassed and annoyed by it. I can see how they might be discouraged, and they would do the work less effectively than at home.

A VOICE: I would allow the question to be passed to the next.

A VOICE: Do not such embarrassments work good rather than harm? That is my experience. If I am embarrassed and cannot answer a question, I know I can answer it the next time; I never forget it.

DR. VINCENT: Are there any disadvantages? We do not succeed very well in holding on to those that are mentioned. You do not allow them to remain when suggested, but answer them.

A VOICE: They take up too much time?

A LADY: Time for what?

A VOICE: They need not take up too much time.

DR. EATON: The most profitable time of the whole year is spent at these local circles.

A VOICE: The punctual members must wait half an hour for the tardy ones.

A VOICE: Not if they commence at the regular time.

DR. VINCENT: That is one of the uncomfortable features of a local circle, but not an argument against it. Punctual members ought not to wait.

A VOICE: Unsatisfactory leadership.

DR. VINCENT: That is a criticism on the manner of conducting local circles rather than a disadvantage. Let us assume that there are no disadvantages—no serious disadvantages in the local circle.

A VOICE: I think that is correct, there are no serious disadvantages, only as we make them.

DR. VINCENT: All who think it is better to have the local circle than not to have it raise your hands. (A large number of hands raised.) Those who think it is not so well to have local circles raise your hands. (A few hands raised.)

A VOICE: How is it when you have only one member in a city?

DR. VINCENT: How many here not only belong to no local circle, but really study by themselves, there being no other person in the neighborhood taking the same course of study? (A number of hands raised.) You see there is quite a large number who cannot have a local circle. Let us take up some of the defects of the local circle. Now your want of punctuality comes in, and your want of successful leadership. A VOICE: Want of willing leaders—those who are willing when requested. A VOICE: Meet too rarely. A VOICE: Meet too often. A VOICE: Meetings too long—become tiresome. A VOICE: Want of a devotional spirit in local circles. A VOICE: Want of a willingness on the part of members to do something.

A VOICE: I wish those friends would be a little more definite. When one says "too long," and another says "too short," we do not know whether they contradict each other or not.

DR. VINCENT: That is the question to be settled. If an interesting subject is not entertainingly handled it becomes too long when they stay there an hour and a half. Sometimes they are too short. I suppose that was meant to be a compliment to the conductor of their local circle.

A VOICE: Too much entertainment aside from the studies.

A VOICE: Too little real teaching.

A VOICE: Some local circles may be too large—too many members.

DR. VINCENT: A local circle may develop an individu

ality which leads to a divorce from the regular circle. I know of but one case of this, and they went together with the rest for a while, and then said they would go alone. One influential man in the circle said: "Why should we take these fragmentary studies at any rate? Why not take up one continuous line of study? Let us take English Literature and devote three months to it. Prof. So-and-so, and Madame So-and-so, both educated people, say this fragmentary way of study is very unsound and not practical, and they would be very glad to outline a course of reading for us." So the local circle bow respectfully to Prof. A—— and Madame B——, and accept the suggestion, and the first we know the members of the local circle are devoted to a study of their own, and write to headquarters, "We have decided the course is too this or too that, and we have taken up a course of our own." I am not sure that the course they have taken up is a defective one. I am not sure that it is not better, viewed from one point of view, than ours. But if the leading idea of our course is the true one, "The College Student's Outlook," they make a mistake when they break from the curriculum and form a curriculum of their own. Where a local circle tends to develop an individuality like that, which in itself tends to separate from the parent circle, the local circle does damage to their members. You have had a case of that kind, Mr. King, in your city, have you not?

A VOICE: I am not Mr. King, though I am from Cleveland. We have taken Swinton's Outlines of History in place of the history published in THE CHAUTAUQUAN.

DR. VINCENT: I do not mean the case of a local circle deciding to take up another book on the same subject. That I think they have a right to do. Without reflection upon the History of the World published in THE CHAUTAUQUAN, I think that the class that decided to take up Swinton's Outlines of History did wisely.

A VOICE: I think I understand the case to which Dr. Vincent refers, and I was satisfied myself when I knew of the change that they had made a great mistake. I am satisfied that our better course is to follow the general outline and keep pace with the general Chautauqua method. I am confident that by so doing we shall do better.

MR. LEWIS C. PEAKE: We have a case very similar to that in our own city (Toronto, Canada). A local circle was formed some two years ago. They considered they were members of the Chautauqua Literary and Scientific Circle. The leader of the circle thought he could outline a course which would be superior in some respects to the one generally followed, and did so, and took it up in his class. The result has been that notwithstanding repeated and persistent efforts on my part to draw them into the line, and secure their affiliation to the general society I have heretofore failed to do so. Although their circle numbers some twenty members, it is a circle that is independent. There is only one member of that circle that is a member of the C. L. S. C. I think that is a great defect. I do not mean to say that it should be classed as an objection to local circles, but it certainly is a great defect in that circle, and I know it is not the desire of the members themselves that it should be so, but it is, if I may use the word, the "pernickedness" of one or two person who are conducting it.

DR. VINCENT: The C. L. S. C. course is not an infallible course, but it is better than it would be if it were worse, and if this be defective we will find it out, and the next time the class goes over it we shall get something better. The course being tolerably good, it is better we adhere to it, and the movement will develop a better course most certainly. For where you enlist twenty-five thousand people in a movement, and bring to the surface the practical experience, the brain power and the literary skill and ability, the outcome will be a better thing than if a few went into it. There may be defects at present, but those defects will bring out better things in the future. If we have enthusiasm in the movement, and loyalty to the course, the local circle will be of great advantage. I noticed the other night that several teachers of the School of Languages did not enter the list for the spelling match prize. They had hard work to get any of our professors to come to the platform. I think they did get one or two. Our professor of Anglo Saxon went up, and went down, too. He says he went down on the second word.

A VOICE: I noticed Dr. Vincent failed to respond.

DR. VINCENT: I spelled on every word that was put out. I did not appear on the platform, although I was called out. A number of the professors and teachers of the School of Languages did not appear. I know why I did not. I was a little ashamed of myself because I did not. And I have the feeling from that little touch of experience that a great many grown people, people that are almost old like myself, have, in going into a class where they are subjected to a regular examination and required to give a recitation. And I am glad to find that this feeling obtains less than I supposed it did. I suppose grown up people have said, "the local circle troubles me a little, because I cannot keep up with the rest, and I gave it up I do the reading, but I am dull, and I do not like to be examined as strictly as they examine the young folks." I think this thing, as unworthy as it is, has operated to keep people away from the local circle. Take a Methodist class meeting, for example, where they require everybody to speak whether he wishes to or not. The leader goes to every one of them and expects every individual to rise up and speak. A great many people will not go, because they will not place themselves in a position where they are likely to be called upon to speak whether they wish to or not. I have known very good class meetings where the leader did not ask anybody to speak unless pretty well assured the person was willing to do so. He made the matter so informal that nobody felt compelled to speak, and the most reluctant were drawn out to give spontaneous expression to their thoughts. There is an ingenious way of conducting local circles by which people are drawn out, and they receive a great deal of instruction. With a good teacher who knows how to manage that class of people, with loyalty to the course, and enthusiasm in the course work, the local circle may be conducted profitable.

REV. H. C. FARRAR: Our local circle meets monthly. We spend an hour and fifteen minutes, or an hour and a half at each session.

DR. VINCENT: What is the very first thing to do?

MR. FARRAR: We pray. We do not sing. We do not read the Scriptures. The minutes of the last meeting are read. After that some one is appointed to ask ten or fifteen questions on History and on Rawlinson's Early Civilizations.

DR. VINCENT: Who answers?

MR. FARRAR: Any one in the class. Then each person is requested to bring two questions for instance, on the History of the World, and we lay them on the table, and the president of the association takes them up, and they are answered by any person who can answer them, and if they cannot be answered, the answer is given that is on the slip of paper passed in. Then we appoint persons to review the work briefly. Our essays are six and eight minutes long—rarely more than ten minutes. One person reviews as briefly and succinctly as possible the reading of a certain book, or a certain part of the CHAUTAUQUAN. We had one person who was very skilled in geology, and he worked up the Conversations on Creation we had in the CHAUTAUQUAN, and brought it up each evening.

DR. VINCENT: Did you not embarrass individual members?

MR. FARRAR: Not a single one. We have thirty people

in the class, and thirty or forty people outside who come in. We hold the meetings at the houses of members. The members vary from those who graduated at colleges to those who have no culture whatever. We have ladies sixty years of age who have written brief essays.

DR. VINCENT: Did you ever have any members sit there without saying anything?

MR. FARRAR: No, sir. In some way or other the leader will make them talk.

DR. VINCENT: What is the name of the leader? [No reply.] Modesty forbids.

A VOICE: The gentleman suggests something about two questions brought in to answer. Are these questions for information?

MR. FARRAR: No, sir, it is to test our knowledge of the history, on Wheatley's History of the World, or Rawlinson's either, at the time we had it under consideration.

A VOICE: Were the questions from those seeking light on some subject?

MR. FARRAR: We have each member bring in interrogatories. We have members bring in words they hear mispronounced, or that they wish the pronunciation of, so that we have a variety of exercises.

DR. VINCENT: Will Prof. Penfield, of Cleveland, give us his plan of conducting a local circle?

PROF. PENFIELD: Our plan is developed under such circumstances that I doubt whether it would be profitable to spend much time on it. We have endeavored to make our meetings an encouragement for those who are pursuing the Chautauqua course, and at the same time make it a literary society following the line of thought of the Chautauqua movement, but bringing in all those that wish to pursue a course of literary reading and training.

DR. VINCENT: So you have some who are not members of the Chautauqua Literary and Scientific Circle?

PROF. PENFIELD: Yes, sir, we unite the two—at least we endeavor to.

DR. VINCENT: It is not a lecture you deliver?

PROF. PENFIELD: No, sir. We aim to have one lecture, occupying from ten to twenty minutes, by some person outside the circle, or at least by some person qualified to give us a first-class literary effort, all in the line of thought, however, of the reading of the members.

DR. VINCENT: You bring in all available talent of the community?

PROF. PENFIELD: Yes, sir, outside the circle as well as in.

DR. VINCENT: Are there any plans differing from those reported? If so let us hear about them in as brief a statement as possible.

REV. JOHN O. FOSTER: I have brought with me a programme of one of our meetings in Sandwich, Illinois. We struck off a large number for our class, and our friends who were permitted to be present. We first had a selection for reading, then a paper on the Medes and Parthians; after that a paper on Egyptian history, and a selection for reading. Then a paper on Homer, and one on the Tongue of Fire. We secured the services of a young physician, and had him give us an essay on the brain. We also had essays on biology, the development theory, the art of speech, and England of the present. After the critic's report followed the Round Table exercises. In the latter we have been searching through literature for some crooked reading that we use as a drill exercise. I have presented the leader with a copy of one of these exercises, and I wish he would read a little of it.

DR. VINCENT: Mr. Foster will please read it himself.

MR. FOSTER: I will read a little of it. "A Philologist's Predicament. He was apparently a splenetic, saturnine old man, whose leisure was occupied in the details and minutiæ of telegraphy and philology. The squalor in which he lived, together with his lugubrious appearance and hypochondriacal actions, not only concealed his acumen and rare prescience, but often subjected him to the contumely and clangor of the hirsute and ribald rascals who properly should have adorned the gallows."

DR. VINCENT: Quite a large segment of the C. L. S. C. think familiar talks on the subjects of study will be more profitable than blunders of speech; the dictionary will help out on those, and is, at any rate, the final court of appeal. Two or three persons have suggested that the blunders in speech exercises are not profitable, and that we should not give as much time to them as heretofore. I will take the voice of the Round Table on that question. Shall we spend some time on blunders of speech? Those who think it is desirable to spend some time as heretofore in elucidating questions, and having them answered, on matters of expression and pronunciation, raise your hands. Those who prefer not to do so raise your hands. It is about an even vote I think, but we shall do it less than heretofore. I think it will be a good plan for you to write out questions about the pronunciation of words and the forms of expression, and then commit the queries to a committee that shall throw out those that are unimportant, and give correct answers and a final decision concerning those more difficult. It is a very good thing to say we have a dictionary, but a great many people do not have one, and while it attempts to give the pronunciation, the living voice will do the work sometimes a good deal better, and one will remember what he says and hears under the excitement of the occasion better than when he goes himself to consult the dictionary. We shall compromise by having written questions in this direction, and submitting them to a committee, and have that committee make a report.

"On one of the memorandum papers we are asked to give the writers of the ages, including biblical writers. Are we to understand those as the inspired writers?" We are.

"Is it true, as reported in the book store, that THE CHAUTAUQUAN will not contain any of the required reading for next year?" DR. VINCENT: Has that been reported at the book-store? I am surprised. There must have been a misunderstanding as to what the book-seller said. *More than one-half of the required reading will appear in* THE CHAUTAUQUAN *next year.*

Here are some questions which were asked at the Round Table at Lakeside. There may be something here that will meet your wants:

"It has been recommended to members of certain churches to read literature other than that in the regular course. What can be done to restore them to the circle, they having temporarily withdrawn, as they do, from this influence?"

I see no objection to substituting denominational religious literature. We have several Roman Catholic members who do not like our Protestant books on biblical themes. I have always given the Roman Catholic members the privilege of reading books on the same subjects recommended by their priests. For we have no idea of attempting to control them or divert them from their own religious faith. A Roman Catholic who enters into this course of reading shows a great deal of enterprise, and a measure of independence. When one writes me, "I would like to read religious books in harmony with my faith," I always say, "Consult some priest, and if the priest tells you what to read, read that book." Unfortunately, where a denominational allusion creeps into a volume, such as occurred in one or two places, I am of course more than willing members should read books of their own denomination instead of the books of the course that are designated as religious. We have but little that is called religious, although we believe all of it is religious to one whose eyes are open. But

it is not specifically called religion, and I would encourage people who want denominational reading to read their own denominational literature, and to read as much of the C. L. S. C. course as possible, and where the reading is in the same line we will accept the denominational reading as a substitute.

A VOICE: Are there any Jews belonging to the Circle?

DR. VINCENT: We have a number of Jews belonging to the Circle. I like to see them join. We have a good many Unitarians in our Circle, and they have had a good deal to read that they thought was not just in harmony with their faith. I had a most interesting letter from a member of a circle in the West. She was a brilliant writer, and a Unitarian, and she became very indignant over "The Tongue of Fire." She said that for a Circle that professed to be undenominational to give people who did not believe the Bible was inspired, and compel them to read, books of that class, was unfair. She said she had not read it and she said, "I *will* not read it," underscoring the word *will* as only a woman does. I wrote her a letter. I asked her if it was just the thing for a person who was disposed to think freely to refuse to read a book, and to denounce it without reading it. I called her attention to the fact that "The Tongue of Fire," aside from its religious bearing, is one of the most admirable pieces of English put into print, and that thousands of people have read that book as a specimen of pure English, who otherwise might disapprove it for one or two denominational allusions it contains. I received a delightful letter from her. She said she was thoroughly ashamed of herself, and she was going to read that book straight through, and all the members of the circle were ashamed of themselves for presuming to judge a book before they read it. It did me a good deal of good. The fact is, I was elected as a member of that local circle afterwards.

"If it is of advantage to belong to a circle, how is it to be accomplished if one lives in such a city as New York, and knows of no one belonging to the C. L. S. C.?"

There are two or three local circles in New York City. One way to get up a local circle is to find somebody else who will unite with you in the course of reading, and when two people agree to read together they have a local circle, and when three they have a triangle, and there are several triangles throughout our C. L. S. C.

"Experience suggests that the ignorant are uncomfortable in a C. L. S. C., and ultimately none but the more cultivated remain. What is the secret of holding the first mentioned class?"

That is one of the questions that came up at Lakeside. I think that Mr. Farrar has answered the question.

"Why are not Chautauqua Library volumes I, II and III of uniform size convenient for binding?"

We resolved, after issuing the first in the style adopted, to change the size that the book might be more portable, in larger type, and not put so much matter in each year. When we come to reproduce volume I, we will probably put it in two volumes to harmonize with the rest in size.

"How large ought circles to become in order to obtain the best results?"

I think the Pittsburgh policy solves that problem. They have many little circles and one large circle. The small circles meet weekly and the large circle monthly.

"The price of C. L. S. C. books is so low that dealers refuse to handle them; persons getting up clubs are always to expense and loss, members expecting them at advertised rates. How is this to be met?"

I have had more experience in dealing with the book-sellers since this movement than ever before. I say to the book-sellers, "Do let us have these books at much less than the regular price for the Circle." Then, for instance, the Harpers said to me, "We will let you have this book, Quackenbos' History of Ancient Literature, at the wholesale price, 80 cents." So I advertised it at 80 cents. But when I come to announce the book at 80 cents, and the book dealers begin to correspond with the Harpers about it, they said, "We sell it to members of the Circle at 80 cents net, and we will sell it to you at 80 cents if you take ten thousand copies." Then the book-sellers say, "If I sell it to you at 80 cents I have got to pay ten or twelve cents postage to send it by mail, so that I would lose ten or twelve cents on every book sold to you." When we influence the book dealers to bring down their prices so low that the authors can not have their copyright, and the local book-sellers will not have their profit, then they can not sell the book. So that, in trying to bring down the price of books to meet the demands of individual members, we drive the books out of the trade, and the local members can not get their books as cheaply as if we charged higher prices and enlisted the local dealers. The American Book Exchange publish certain books, and publish them very cheaply, especially reprints, and they expect very large sales. But when I take a standard book, like this book of Dr. Quackenbos', the Harpers own the copyright, and Dr. Quackenbos, or his heirs—he died a short time since—are entitled to a royalty of ten per cent. on it. The Harpers have to pay interest on capital, and rents, and keep their clerks, and they must make some money on books. They can not give them away, and we are compelled, as members of the Circle, to pay for the books. Now, I hold here the books for the coming year—pretty much all of them. This is the work on art. When you look at that book, and the engravings in it, the most of them are from Lubke's more elaborate work on art, when you look at the kind of paper and binding, that is a very cheap book at a dollar and a half. You pay ten cents for the little Chautauqua Text-book on Art. You pay one dollar for this book on Ancient Literature. I have explained about the price of that. I supposed as they sold "Cyrus and Alexander" at 80 cents, they were going to sell this at 80 cents, and I so advertised it, but it is a dollar instead of 80 cents. But you get the History of Art at fifty cents less than it was advertised, so that on the two there is a saving of thirty cents from the announced prices. The Franklin Square Library contains Mackenzie's Nineteenth Century. It is in fine type, and a great many people do not like it. The price is fifteen cents. It is also published by Nelson & Sons, in book form, and in beautiful type, for one dollar. You can have it for fifteen cents or one dollar. You must decide what your books will cost you. I think that it is always better to have a book that you can keep. If you could afford to pay for the books required, and have books instead of THE CHAUTAUQUAN, it would have its advantages. But THE CHAUTAUQUAN, coming every month, has its advantages, and to many people its cheapness is also a great consideration.

At the request of Dr. Vincent an auditing committee was appointed to audit the accounts of the C. L. S. C. The members of the Circle designated Mr. F. C. Carley, of Louisville, Ky., Mr. Julius King, of Cleveland, O., and Rev. H. C. Farrar, of Gloversville, N. Y., to constitute the committee.

The second memorial day for November is Special Sunday, the 12th. The selection to be read is the 28th chapter of Job, that wonderful discourse on wisdom. Man can find the hidden treasures of the earth, but concealed from the eyes of all living is the knowledge of God's secret councils, and the reasons of his providential dealings with men. "The fear of the Lord, that is wisdom; and to depart from evil is understanding." Let no member of the C. L. S. C. fail to read this chapter on the day designated as Special Sunday.

THE HISTORY OF ART.

ONE HUNDRED QUESTIONS AND ANSWERS ON THE HISTORY OF ART—FROM THE RENAISSANCE TO ART IN THE NINETEENTH CENTURY, BOTH INCLUDED.

1. Q. What did the newly awakened love for nature, and the increased intellectual activity following the reaction from Mediævalism, do for art? A. It produced the great revival of art known as the period of the Renaissance.

2. Q. What is the aim of the realistic artist, and what of the idealistic artist? A. The realistic artist, with unavoidable limitations, aims to produce a likeness of a person or scene. The idealistic artist seeks, by means of his art, to express either his own thoughts, or the thoughts of others.

3. Q. What are some of the most marked characteristics of Renaissance architecture? A. A symmetry of the parts of buildings, increase in the size of piers and bays and diminution in numbers, abandonment of small stones in the construction of walls, and reappearance of the classic orders as decorative features.

4. Q. Into what three periods may Renaissance architecture in Italy be divided? A. Early Renaissance, 1420 to 1500; high Renaissance, 1500 to 1580; late Renaissance, or Boroque, 1580 to 1800.

5. Q. Who was the greatest Italian architect, where the greatest art center, and what the most important buildings of the first period? A. Brunelleschi the greatest architect; Florence the great art center, and the Pitti and Strozzi palaces, and the Dome of Santa Maria, the Cathedral in Florence, the most important buildings.

6. Q. What is the greatest architectural monument of the high Renaissance in Italy? A. St. Peter's at Rome, the largest church in Christendom.

7. Q. Name three of the architects that were employed on the work of erecting this church? A. Brämänte made the original plan, Michael Angelo designed the dome, and Bernini added the great court as an approach to the façade.

8. Q. What marks the third and latest period of Renaissance architecture? A. Overloaded and extravagant ornament.

9. Q. How are Renaissance buildings usually classified in France? A. According to the reign of the prominent sovereigns.

10. Q. Mention a prominent building of the Renaissance in France. A. The Louvre at Paris.

11. Q. How is the transition from Gothic to Renaissance architecture in England known? A. As Elizabethan.

12. Q. When was pure Renaissance architecture introduced into England? A. In the reign of James I.

13. Q. What church in England, next in size to St. Peter's at Rome, is of the Renaissance style of architecture? A. St. Paul's at London.

14. Q. Who was the greatest sculptor of the early Renaissance in Italy? A. Lorenzo Ghiberti, of Florence.

15. Q. What were his masterpieces of sculpture? A. The Bronze Gates of the Baptistery at Florence.

16. Q. Who founded a school, and produced reliefs in *terra-cotta*, covered with colored glaze of his own invention? A. Luca Della Robbia.

17. Q. Mention two other prominent sculptors of the early Renaissance in Italy. A. Donatello and Andrea Verocchio.

18. Q. Mention three names prominent during the period of high Renaissance sculpture in Italy? A. Andrea Sansoviho, Michael Angelo, and Jacopo Sansovino.

19. Q. What has Andrea Sansovino been called? A. The Raphael of sculpture, his conceptions were so pure, and his forms so perfect.

20. Q. Who was the greatest sculptor of the Renaissance? A. Michael Angelo.

21. Q. What are his greatest works? A. His colossal statues of David and Moses, and the monuments to the Medicis.

22. Q. What is the most remarkable work of Jacopo Sansovino? A. The bronze door of St. Mark's, at Florence.

23. Q. In what field did the picturesque tendency of Renaissance sculpture first become apparent in Germany? A. In wood carving.

24. Q. Who was the greatest wood carver of the early Renaissance? A. Veit Stoss, of Nuremberg.

25. Q. Who was the greatest master of stone sculpture in Germany? A. Adam Krafft, a native of Nuremberg.

26. Q. Who in Germany was eminent in bronze work. A. Peter Vischer.

27. Q. Give the masterpiece of each of the three German sculptors named. A. Of Stoss, The Angel's Salutation, in the Church of St. Lawrence; of Krafft, The Seven Stages of the Cross; of Vischer, The Tomb of St. Sebald, at Nuremberg.

28. Q. Who was the leading sculptor of the late Renaissance in Italy? A. Lorenzo Bernini.

29. Q. Into what three periods is Renaissance painting in Italy divided? A. Early Renaissance, the period of preparation; high Renaissance, the period of perfection; and late Renaissance, the period of decline.

30. Q. What were the three most important schools of the first period? A. The Florentine, the Paduan, and the Venetian.

31. Q. Who were the most noted painters of the Florentine or Tuscan school? A. Masaccio and Domenico Ghirlandajo.

32. Q. What are Masaccio's masterpieces? A. The frescos in the Carmine Church of Florence.

33. Q. Who was the only really great artist of the Paduan school of north Italy? A. Andrea Mantegna.

34. Q. What are his chief works? A. The frescos in the Eremitani Chapel at Padua, representing scenes from the life of St. James.

35. Q. Who were the two most prominent artists of the Venetian school? A. The Bellini brothers, Gentile and Giovanni.

36. Q. In what painting by Giovanni Bellini has it been said the "canon" of Venetian art was laid down? A. The enthroned Madonna, now in the Venice Academy.

37. Q. Give the names of three of the most noted Italian painters of the Tuscan School during the high Renaissance. A. Leonardo Da Vinci, Michael Angelo, and Raphael.

38. Q. Name of some of the varied acquirements of Leonardo Da Vinci. A. He was an architect, a sculptor, a musician, and a poet, as well as a painter.

39. Q. Of what is it said he was a thorough master? A. Of the most subtle shades of expression in the human countenance.

40. Q. What is generally considered his masterpiece as a portrait-painter? A. La Giocunda, now in the Louvre, in Paris.

41. Q. What is his greatest work? A. His world renowned fresco of the "Last Supper," at Milan.

42. Q. As an artist, in what was Michael Angelo great? A. In sculpture and architecture, and no less great in painting.

43. Q. What was his greatest work in painting? A. His decorations of the Sistine Chapel of the Vatican, at Rome. These completed the history of the world, which previous artists had begun in the series of pictures on the side walls.

44. Q. What is said of his impersonations of the Deity in

the Sistine Chapel? A. They are unequalled in grandeur and sublimity. In his conception of the Creator he is the only artist who has not been irreverent.

45. Q. What was his latest work in painting? A. The Last Judgment, painted over the altar of the Sistine Chapel.

46. Q. Into what three periods are the works of Raphael divided? A. His Umbrian manner, his Florentine manner, and his Roman manner.

47. Mention a painting characteristic of each period. A. The Marriage of the Virgin, of the first; La Belle Jardiniere, of the second; St. Cecilia, of the third.

48. Q. What was the last picture that Raphael painted? A. The transfiguration.

49. Q. What painter of Parma was a rival of the great Venetian's in the beauty of his coloring, and in what did his greatest art lie? A. Correggio, in his power of portraying the human form in motion.

50. Q. Give the names of three great painters of the Venetian school during the high Renaissance. A. Giorgione, Titian, and Veronese.

51. Q. In what did Giorgione excel? A. He excelled as a portrait painter, and is said to have been the first to combine scenes from domestic life and beautiful landscapes.

52. Q. What was one of Titian's greatest pictures, destroyed some time since by fire? A. The murder of Peter, of Verona.

53. Q. On what does the reputation of Veronese chiefly rest? A. On his representation of festivals.

54. Q. From what source are his scenes selected as the basis of his pictures? A. From sacred history, but the devotional element is entirely lacking.

55. Q. What constituted the main distinctive features of the eclectic and naturalistic schools of late Renaissance painting in Italy? A. The eclectics sought to create a style which should combine the special excellencies of all great artists. The naturalists sought to bring everything down to the common level of ordinary existence, and to show that the events of sacred history were utterly prosaic.

56. Q. Give the name of a representative painter of each school. A. Guido of the eclectic school, and Caravaggio of the naturalistic school.

57. Q. What became a very important branch of art in the North during the Renaissance? A. Engraving on wood and copper.

58. Q. What are the principal methods of engraving in ancient and in modern times? A. Etching, line engraving, mezzotint, aquatint, stipple engraving, and engraving on wood.

59. Q. Who were the founders of the Flemish school of painting in the Netherlands at the time of the early Renaissance? A. Hubert and Jan Van Eyck, the reputed inventors of oil painting.

60. Q. What is their most celebrated picture? A. The "Adoration of the Spotless Lamb," in the altar-piece at Ghent.

61. Q. Name two other prominent painters of the early Renaissance in the Netherlands? A. Roger Van Der Weyden and Hans Memling.

62. Q. What is said of the second period of Flemish art, called the Italian period, extending through the sixteenth century? A. Foreign influence temporarily ingulfed all native originality.

63. Q. What are the revival of the Catholic Flemish school under Rubens, and the Dutch revival under Rembrandt, called? A. The third and fourth periods of Flemish painting, and belong to the seventeenth century, the epoch of the late Renaissance.

64. Q. Who were the two most noted painters of the third period? A. Peter Paul Rubens and Antony Van Dyck.

65. Q. What is said of the genius of Rubens? A. He was equally at home in all branches of painting, and in his line was one of the most brilliant geniuses the world has ever seen.

66. Q. How many pictures is he said to have painted? A. Eighteen hundred; but a large number of them were undoubtedly executed by his pupils.

67. Q. How is Van Dyck chiefly celebrated? A. As a portrait-painter.

68. Q. Give the names of four painters in the fourth period of art in the Netherlands, and state in what line each was eminent. A. Rembrandt, eminent as an historical painter; Douw, noted as a painter of scenes from domestic life; Ruysdæl, celebrated as a landscape artist; and Paul Potter, famous as a cattle painter.

69. Q. What is said of the German schools of the early Renaissance? A. They were more or less influenced by the Van Eycks, but they still retained their true German characteristics, such as angular corners in the folds of the drapery, and vivid effects of light and shade.

70. Q. Who were the two most noted painters of the high Renaissance period in Germany? A. Albert Dürer and Hans Holbein, the younger.

71. Q. What is said of Dürer's accomplishments? A. He may not unjustly be called the founder of the German school. He was a sculptor, an engraver, and an architect, as well as a painter.

72. Q. What is said of the works of Holbein? A. He excelled as a painter of portraits, and executed many large historical works, both in England and in his native land.

73. Q. What is stated in reference to Maria Angelica Kauffman, a painter of the late Renaissance period in Germany? A. She had great talent but it did not amount to genius.

74. Q. What two great artists did Spain produce in the seventeenth century? A. Velasquez and Murillo, who will well bear comparison with the best Renaissance painters of Italy.

75. Q. In what did Velasquez especially excel? A. He was a universal genius, and was one of the most remarkable portrait-painters the world has ever seen.

76. Q. What is said of the eminence of Murillo? A. He was the most eminent of all the Spanish painters. His chief fame rests on his sacred compositions.

77. Q. What was the character of the Renaissance school of painting in France? A. It was eclectic.

78. Q. Who were the two most noted painters of the French Renaissance? A. Poussin and Claude Lorraine.

79. Q. What is said peculiarly of Lorraine? A. He was the first ideal landscape painter of modern times.

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80. Q. How many classes are there of Buddhist buildings? A. Five.

81. Q. What two of these classes are usually cut in the rock? A. The chaityas, or assembly halls, corresponding to our churches, and the viharas, or dwellings, for Buddhist hermits.

82. Q. What interesting monuments of Hindu civil architecture are found in Central and Northern India? A. Tombs and palaces.

83. Q. What are the only monuments of plastic art the Buddhists ever executed? A. Figures of Buddha lost in profound contemplation.

84. Q. When Brahminism supplanted Buddhism, and sculpture received a powerful impulse, how were buildings decorated with reliefs? A. Very profusely. The figures in these reliefs were fantastic, and the actions exaggerated.

85. Q. Why did the artistic genius of the Arabians find vent only in architecture? A. Because pictures and images were forbidden by the Koran.

86. Q. What are the common property of all the Mohammedan styles of architecture? A. The general plans of mosques, the use of the pointed arch, and an elaborate and beautiful system of surface-decoration.

87. Q. Where are the most remarkable buildings of Mohammedan art? A. In Spain.

88. Q. What two Mohammedan buildings in Spain have a world-wide fame? A. The great mosque at Cordova, and the fortress of the Alhambra, at Granada.

89. Q. In what direction does the chief artistic talent of the Chinese and Japanese seem to lie? A. In the direction of decorative work.

90. Q. What are the most familiar forms of Chinese architecture? A. The so-called taas, or nine-storied pagodas.

91. Q. What do modern architects seek to give to separate buildings? A. An individual character; but they are inclined to follow ancient, classic, and mediæval forms, reproducing them in some new combination, or copying them as exactly as possible.

92. Q. Give the names of five noted sculptors of the nineteenth century. A. Antonio Canova, Lorenzo Bartolini, Italians; Bertel Thorwaldsen, Dane; Ludwig Schwanthaler, the head of the Munich schools; A. L. Barye, of France, great as a sculptor of animals. (Bä'ray')

93. Q. Give the names of five eminent modern painters of England. A. William Hogarth, Sir Joshua Reynolds, Thomas Gainsborough, Sir Edward Landseer, and Joseph M. W. Turner.

94. Q. Give the names of three eminent painters of England of the nineteenth century who were born in America. A. Benjamin West, John Singleton Copley, and Charles Robert Leslie.

95. Q. Give the names of five French painters of the nineteenth century. A. Jacques Louis David, Paul Delarouche, Horace Vernet, and Corot. (Jhack) (*Kó'ro')

96. Q. Who of the French is called the peasant-painter? A. Jean François Millet. He was unappreciated by his countrymen during the greater part of his life. (mee'yay)

97. Q. Who was the leader of the modern classic revival of painting in Germany? A. Asmus Carstens, the son of a miller.

98. Q. What phase of modern German painting was represented by a colony of young German artists settled at Rome? A. The religious art of Giotto and Fra Angelico, by cultivating characteristics of the pictures painted before the time of Raphael. (Jot'to)

99. Q. What cities are the chief centers of German art at the present time? A. Vienna, Munich, Berlin, and Düsseldorf.

100. Q. What three men may be regarded as the founders of a distinctively American school of painting? A. Washington Allston, Asher B. Durand, and Thomas Cole.

C. L. S. C. NOTES AND LETTERS.

A number of questions that are likely to suggest themselves to members will be found answered very fully by Dr. Vincent, in the Chautauqua Round Table proceedings, published in this number of THE CHAUTAUQUAN.

Most members have doubtless observed that there is an error in No. 65 of Questions and Answers on the History of Art, as printed in the October CHAUTAUQUAN. The name "Pericles" should be "Phidias," and the question should read, "What were two of the most noted statues of Phidias?"

Progress is sometimes slow when it is sure, and the good results that come from pursuing the systematic course of the C. L. S. C. are not always apparent at once. Time, however, is pretty certain to reveal some advantage gained. A lady member, for instance, who says she is enjoying the course very much, writes: "I can see considerable gain in one way. I can do more in the same time than I could at first." That is certainly one great point attained, and other good results will follow.

The Superintendent of a Sunday-school says: "Having read somewhat during the progress of an active business life, I now find this course of reading of the C. L. S. C., for what ought to be my ripening years, superb, and just what I need. It is not only refreshing to memories of past works, but greatly beneficial in directing thought and act for the future. Success for the enterprise is no doubt secured. That its projector may have continued prosperity in this vast field of labor is my highest hope."

The following words that come from Honolulu show that the separation by long stretches of land and sea from Chautauqua does not quench the spirit of fraternity that pervades all loyal members of the C. L. S. C.: "Your anniversary season is just at hand, and though I can not be there, still I shall greatly enjoy reading of all that goes on, and I hope that some of the inspiring influences that you will all come under may reach out beyond the land and over the sea to us who are unable to come directly in contact with them."

A lady member writes from Canada: "I can not tell you how much pleasure I have taken during the past nine months while studying the different books and papers of this course. It is some years—five or six—since I left school, and consequently I was quite out of the way of reading systematically. I fear my report will be very poor this year, but I am sure the reading has been a very great benefit to me, and I would not give it up under any consideration."

The full history of the C. L. S. C. will never be written. There are struggles, and defeats, and victories that do not find a record in the archives of the C. L. S. C. The achievements are none the less glorious because the world does not stand by to listen and applaud. One of these heroes is thus alluded to by a correspondent: "You have a member of 1882 here whose history as a student, in the midst of debt, all the care of a farmer, with many dependent upon him, sickness and death in his family, and manifold duties in church, Sunday-school, choir and community, would rival 'The Chautauqua Story' of Pansy."

Two short letters before us show the persevering spirit which characterizes many who are pursuing the C. L. S. C. course. One member writes: "My business has required my strict attention for the last two or three months. I thought at one time I would give up my studies, but they are so great a help to me I could not make up my mind to do so. I had rather be a little behind the class than to give them up, for when I do have time I get a great deal of good from them." Another, of the class of 1884, says: "I have had no helps in my study during the year outside of the required books, but I would not give up the course for anything. I feel very much benefitted by this one year of study. I have felt the need of some systematic course of study, as I could not go to college, and this is just the thing. I am thankful that you were prompted to originate this course."

A lady member writes from Nevada, as follows: "I am getting along slowly with my reading, and sometimes am very much discouraged, but I don't want to give it up. It

is going to be very hard for me to remember what I have read. For six years I have been away from all society, and my only amusement has been novel-reading. It is difficult for me to apply myself to anything that requires study. I will not give up. I am losing taste for the light reading, and am very much pleased with the Circle." This letter shows the right spirit, and one that cannot well fail to meet with success. The writer's experience is the repetition of that of many others. Good reading takes away the taste for the trashy novel. History, science, art, and literature cultivate the higher faculties, ennoble thest udent, and render distasteful all that does not tend to elevate. Memory strengthens with the effort to remember, and holds more firmly to that which is worthy of being retained.

A Canadian edition of the Popular Education Circular of the C. L. S. C. has been issued. It is signed by James L. Hughes, president, and Lewis C. Peake, secretary, of the Toronto C. L. S. C., both well known to many old Chautauquans. In a special address to Canadians they say: "The necessity for literary culture is widely felt. There is scarcely a village or school section in Canada in which there are not a few people who have a longing for the establishment of a mutual improvement society of some sort in their neighborhood during the winter months. This desire shows itself in the literary societies, debating clubs, and young people's associations started at one time or another, in connection with every church, school-house, and temperance society throughout the land. Unfortunately, however, these societies usually languish and die after a short existence. The moving spirit in connection with them is often the minister or the teacher, and when he removes from the district the society is given up. Each association stands alone, receiving neither inspiration nor direction from any other; each works on its own line, without the advantage of the experience of others, and so the work done is not continuous nor systematic. To organize all such societies into one, to bind them together by the common ties of interest and emulation, to direct them in prosecuting their work from one central department, would surely be one of the grandest educational reforms of the age. The Rev. Dr. Vincent conceived the idea of accomplishing this great work, and by founding the Chautauqua Literary and Scientific Circle, he has established a simple and effective means for the accomplishment of his noble purpose.

LOCAL CIRCLES.*

MEMORIAL DAYS.

BRYANT'S DAY.

NOVEMBER 3d.

BRYANT BORN, NOVEMBER 3d,

1794.

[*Readings for the Bryant Memorial Day.*]

THANATOPSIS. (BRYANT.)

To him who in the love of Nature holds
Communion with her visible forms, she speaks
A various language; for his gayer hours
She has a voice of gladness, and a smile
And eloquence of beauty, and she glides
Into his darker musings, with a mild
And healing sympathy, that steals away
Their sharpness ere he is aware. When thoughts
Of the last bitter hour come like a blight
Over thy spirit, and sad images
Of the stern agony, and shroud, and pall,
And breathless darkness, and the narrow house,
Make thee to shudder, and grow sick at heart;—
Go forth, under the open sky, and list
To Nature's teachings, while from all around—
Earth and her waters, and the depths of air—
Comes a still voice—Yet a few days and thee
The all-beholding sun shall see no more
In all his course; nor yet in the cold ground,
Where thy pale form was laid with many tears,
Nor in the embrace of ocean shall exist
Thy image. Earth, that nourished thee, shall claim
Thy growth, to be resolved to earth again,
And, lost each human trace, surrendering up
Thine individual being, shalt thou go
To mix forever with the elements,
To be a brother to the insensible rock,
And to the sluggish clod which the rude swain
Turns with his share, and treads upon. The oak
Shall send his roots abroad, and pierce thy mold.

Yet not to thine eternal resting place
Shalt thou retire alone, nor couldst thou wish
Couch more magnificent. Thou shalt lie down
With patriarchs of the infant world—with kings,
The powerful of the earth—the wise, the good,
Fair forms, and hoary seers of ages past,
All in one mighty sepulcher. The hills
Rock-ribbed and ancient as the sun,—the vales
Stretching in pensive quietness between;
The venerable woods—rivers that move
In majesty, and the complaining brooks
That make the meadows green; and, poured round all,
Old Ocean's gray and melancholy waste,—
Are but the solemn declarations all
Of the great tomb of man. The golden sun,
The planets, all the infinite host of heaven,
Are shining on the sad abodes of death,
Through the still lapse of ages. All that tread
The globe are but a handful to the tribes
That slumber in its bosom.—Take the wings
Of morning, pierce the Barcan wilderness,
Or lose thyself in the continuous woods
Where rolls the Oregon, and hears no sound
Save his own dashings—yet the dead are there:
And millions in those solitudes, since first
The flight of years began, have laid them down
In their last sleep—the dead reign there alone.
So shalt thou rest, and what if thou withdraw
In silence from the living, and no friend
Take note of thy departure? All that breathe
Will share thy destiny. The gay will laugh
When thou art gone, the solemn brood of care
Plod on, and each one as before will chase
His favorite phantom; yet all these shall leave
Their mirth and their employments, and shall come
And make their bed with thee. As the long train
Of ages glide away, the sons of men,
The youth in life's green spring, and he who goes
In the full strength of years, matron and maid,
The speechless babe, and the gray-headed man—
Shall one by one be gathered to thy side
By those who in their turn shall follow them.

So live, that when thy summons comes to join
The innumerable caravan, which moves

* All communications from local Circles intended for THE CHAUTAUQUAN should be addressed to Albert M. Martin, General Secretary of the C. L. S. C., Pittsburgh, Pa.

To that mysterious realm, where each shall take
His chamber in the silent halls of death,
Thou go not, like the quarry-slave at night,
Scourged to his dungeon, but sustained and soothed
By an unfaltering trust, approach thy grave,
Like one who wraps the drapery of his couch
About him, and lies down to pleasant dreams.

A FOREST HYMN. (BRYANT.)

The groves were God's first temples. Ere man learned
To hew the shaft, or lay the architrave,
And spread the roof above them—ere he framed
The lofty vault, to gather and roll back
The sound of anthems; in the darkling wood,
Amid the cool and silence, he knelt down,
And offered to the Mightiest solemn thanks
And supplication. For his simple heart
Might not resist the sacred influences
Which, from the stilly twilight of the place,
And from the gray old trunks that high in heaven
Mingled their mossy boughs, and from the sound
Of the invisible breath that swayed at once
All their green tops, stole over him, and bowed
His spirit with the thought of boundless power
And inaccessible majesty. Ah, why
Should we, in the world's riper years, neglect
God's ancient sanctuaries, and adore
Only among the crowd, and under roofs
That our frail hands have raised? Let me at least,
Here, in the shadow of this aged wood,
Offer one hymn—thrice happy, if it find
Acceptance in His ear.

Father, thy hand
Hath reared these venerable columns, thou
Didst weave this verdant roof. Thou didst look down
Upon the naked earth, and, forthwith, rose
All these fair ranks of trees. They, in thy sun,
Budded, and shook their green leaves in thy breeze,
And shot toward heaven. The century-living crow
Whose birth was in their tops, grew old and died
Among their branches, till, at last, they stood,
As now they stand, massy, and tall, and dark,
Fit shrine for humble worshiper to hold
Communion with his Maker. These dim vaults,
These winding aisles, of human pomp or pride
Report not. No fantastic carvings show
The boast of our vain race to change the form
Of thy fair works. But thou art here—thou fill'st
The solitude. Thou art in the soft winds
That run along the summit of these trees
In music; thou art in the cooler breath
That from the inmost darkness of the place
Comes, scarcely felt; the barky trunks, the ground,
The fresh moist ground, are all instinct with thee.
Here is continual worship:—Nature, here,
In the tranquility that thou dost love,
Enjoys thy presence. Noiselessly, around,
From perch to perch, the solitary bird
Passes; and yon clear spring, that, midst its herbs,
Wells softly forth and wandering steeps the roots
Of half the mighty forest, tells no tale
Of all the good it does. Thou hast not left
Thyself without a witness, in these shades,
Of thy perfections. Grandeur, strength, and grace,
Are here to speak of thee. This mighty oak—
By whose immovable stem I stand and seem
Almost annihilated—not a prince,
In all that proud old world beyond the deep,
E'er wore his crown as loftily as he
Wears the green coronal of leaves with which
Thy hand has graced him. Nestled at his root
Is beauty, such as blooms not in the glare
Of the broad sun. That delicate forest flower
With scented breath and look so like a smile,
Seems, as it issues from the shapeless mold,
An emanation of the indwelling Life,
A visible token of the upholding Love,
That are the soul of this great universe.

My heart is awed within me when I think
Of the great miracle that still goes on,
In silence, around me—the perpetual work
Of thy creation, finished, yet renewed
Forever. Written on thy works I read
The lesson of thy own eternity.
Lo! all grow old and die—but see again,
How on the faltering footsteps of decay
Youth presses—ever gay and beautiful youth
In all its beautiful forms. These lofty trees
Wave not less proudly that their ancestors
Molder beneath them. Oh, there is not lost
One of earth's charms: upon her bosom yet,
After the flight of untold centuries,
The freshness of her far beginning lies
And yet shall lie. Life mocks the idle hate
Of his arch-enemy Death—yea, seats himself
Upon the tyrant's throne—the sepulcher,
And of the triumphs of his ghastly foe
Makes his own nourishment. For he came forth
From thine own bosom, and shall have no end.

There have been holy men who hid themselves
Deep in the woody wilderness, and gave
Their lives to thought and prayer, till they outlived
The generation born with them, nor seemed
Less aged than the hoary trees and rocks
Around them;—and there have been holy men
Who deemed it were not well to pass life thus.
But let me often to these solitudes
Retire, and in thy presence reassure
My feeble virtue. Here its enemies,
The passions, at thy plainer footsteps shrink
And tremble and are still. O God! when thou
Dost scare the world with tempests, set on fire
The heavens with falling thunderbolts, or fill,
With all the waters of the firmament,
The swift dark whirlwind that uproots the woods
And drowns the villages; when, at thy call,
Uprises the great deep and throws himself
Upon the continent, and overwhelms
Its cities—who forgets not, at the sight
Of these tremendous tokens of thy power,
His pride, and lays his strifes and follies by?
Oh, from these sterner aspects of thy face
Spare me and mine, nor let us need the wrath
Of the mad, unchained elements to teach
Who rules them. Be it ours to meditate,
In these calm shades, thy milder majesty,
And to the beautiful order of thy works
Learn to conform the order of our lives.

PLANTING OF THE APPLE-TREE, (BYRANT.

Come, let us plant the apple-tree.
Cleave the tough greensward with the spade;
Wide let its hollow bed be made;
There gently lay the roots, and there
Sift the dark mold with kindly care,
And press it o'er them tenderly,
As, round the sleeping infant's feet,
We softly fold the cradle-sheet;
So plant we the apple-tree.

What plant we in this apple-tree?
Buds, which the breath of summer days
Shall lengthen into leafy sprays;
Boughs, where the thrush, with crimson breast,
Shall haunt and sing and hide her nest;
We plant, upon the sunny lea,
A shadow for the noontide hour,
A shelter from the summer shower,
When we plant the apple-tree.

What plant we in this apple-tree?
Sweets for a hundred flowery springs
To load the May-wind's restless wings,
When, from the orchard-row, he pours
Its fragrance through our open doors;
A world of blossoms for the bee,
Flowers for the sick girl's silent room,
For the glad infant, sprigs of bloom,
We plant with the apple-tree.

What plant we in this apple-tree?
Fruits that shall swell in sunny June,
And redden in the August noon,
And drop, when gentle airs come by,
That fan the blue September sky,
When children come, with cries of glee,
And seek them where the fragrant grass
Betrays their bed to those who pass,
At the foot of the apple-tree.

And when, above this apple-tree,
The winter stars are quivering bright,
And winds go howling through the night,
Girls, whose young eyes o'erflow with mirth,
Shall peel its fruit by cottage hearth,
And guests in prouder homes shall see,
Heaped with the grape of Cintra's vine,
And golden orange of the line,
The fruit of the apple-tree.

The fruitage of this apple-tree
Winds and our flag of stripe and star
Shall bear to coasts that lie afar,
Where men shall wonder at the view,
And ask in what fair groves they grew;
And sojourners beyond the sea
Shall think of childhood's careless day,
And long, long hours of summer play,
In the shade of the apple-tree.

Each year shall give this apple-tree
A broader flush of roseate bloom,
A deeper maze of verdurous gloom,
And loosen, when the frost-clouds lower,
The crisp brown leaves in thicker shower;
The years shall come and pass, but we
Shall hear no longer, where we lie,
The summer's songs, the autumn's sigh,
In the boughs of the apple-tree.

And time shall waste this apple-tree.
Oh, when its aged branches throw
Thin shadows on the ground below,
Shall fraud and force and iron will
Oppress the weak and helpless still?
What shall the tasks of mercy be,
Amid the toils, the strifes, the tears
Of those who live when length of years
Is wasting this little apple-tree?

"Who planted this old apple-tree?"
The children of that distant day,
Thus to some aged man shall say;
And, gazing on its mossy stem,
The gray-haired man shall answer them:
"A poet of the land was he,
Born in the rude but good old times;
'Tis said he made some quaint old rhymes
On planting the apple-tree."

SPECIAL SUNDAY,

NOVEMBER 10th.

Read Job, xxviii Chapter.

At the second Chautauqua Round Table Conference of the C. L. S. C. for 1881, the subject of local circles received special attention. A full report of the discussion is published elsewhere in THE CHAUTAUQUAN, and will doubtless have a careful reading.

Conductors of local circles will find it extremely advantageous to supplement the information contained in Miss De Forest's work on the History of Art. Those who have access to the American Cyclopedia will obtain help by reading the articles there printed on "Architecture," "Sculpture," and "Painting." The Encyclopædia Britannica has a very complete and admirably illustrated article on "Architecture," and also quite extensive articles on "Archæology" and "Basilica." But undoubtedly the best aid the conductor of local circles can obtain at a moderate cost, and in compact shape, is Dr. Wilhelm Lübke's "Outlines of the History of Art." A new translation from the seventh German edition has been recently published, edited by Clarence Cook. The publishers have issued a student's edition, in two volumes, at a reduced price. Miss De Forest's work is based largely upon it, and the treatment of the subject is in nearly the same line. It is a standard work, and members of the C. L. S. C. will find it admirably adapted to their wants in enlarging their study of the History of Art.

The November C. L. S. C. reading is contained in the "Required Reading" of THE CHAUTAUQUAN for November, Miss De Forest's Short History of Art, from page 184 to the end of the book, and in Chautauqua Text-book No. 32, from page 34 to the end of the book. One hundred questions and answers are printed elsewhere in THE CHAUTAUQUAN, based on the reading in the History of Art. As an aid to local circles that meet weekly, as well as to others who wish such a division of the work, we apportion the reading for the month into four parts, as follows:

FIRST WEEK.—1. Short History of Art, from page 184 to page 215.—The Renaissance—Architecture and Sculpture.

2. Chautauqua Text-Book No. 32, from page 34 to page 40.

3. Questions and answers on the History of Art, from 1 to 28, inclusive.

4. Questions for further study: What is the Louvre of Paris? Who were the Medicis? Who was St. Sebald? Who was the Great Elector?

5. Write papers on the following subjects: The period of the Renaissance. St. Peter's at Rome.

6. Read Mosaics of History and Geology as published in THE CHAUTAUQUAN.

SECOND WEEK.—1. Short History of Art, from page 215 to page 266.—Renaissance painting in Italy and Venice.

2. Chautauqua Text-Book No. 32, from page 41 to page 50.

3. Questions and answers on the History of Art, from 29 to 56, inclusive.

4. Questions for further study: Who were Saints Francis, Sebastian, Dominic and Louis? What is the Kensington Museum at London? Who was Peter of Verona? According to mythology, what are the circumstances attending the marriage of Bacchus and Ariadne?

5. Write papers on the following subjects: Life and work of Michael Angelo. The pictures of Madonnas.

6. Read Mosaics of History and Geology as published in THE CHAUTAUQUAN.

THIRD WEEK.—1. Short History of Art, from page 266 to page 309. The Renaissance—painting in the North, Flemish painting, painting in the Netherlands, Germany, Spain, and France.

2. Chautauqua Text-Book No. 32, from page 41 to 53, such paragraphs as treat of Renaissance painting in the North, Flanders, the Netherlands, Germany, Spain and France.

3. Questions and answers on the History of Art, from 57 to 79, inclusive.

4. Questions for further study: What were the circumstances attending the martyrdom of Saint Ursula? When and how was the monk Sergius killed by Mahomet? Describe the scene represented by the vignette on title page of the Great Passion, by Dürer. Who was the great Christopher?

5. Write papers on the following subjects: Wood Engravings; Life and Works of Murillo.

6. Read Mosaics of History and Geology as published in THE CHAUTAUQUAN.

FOURTH WEEK.—1. Short History of Art, from page 310 to end of book. Pagan art in the Christian Era, and Art in the Nineteenth Century.

2. Chautauqua Text-Book No. 32, from page 53 to end of book.

3. Questions and answers on the History of Art, from 80 to 100, inclusive.

4. Questions for further study: What are the sacred trees of Java, and why so called? Why did the Koran forbid pictures and images? Why is the temple of the Great Dragon, at Pekin, so called? What sculptor designed the bronze gates of the capitol at Washington? What four noted historical paintings are in the rotunda of the capitol at Washington, and by whom were they painted?

5. Write papers on the following subjects: Buddhism and Brahminism. Eminent living Artists and their Masterpieces.

6. Complete reading of Mosaics of History and Geology as published in THE CHAUTAUQUAN.

Note.—Members of the C. L. S. C. are requested to send answers to "questions for further study," to Albert M. Martin, General Secretary of the C. L. S. C.

In Watseka, Ill., four Chautauqua girls have formed a local circle. Their names are Misses Ora Chamberlain, Dora McGill, Hattie Gillfillian and Ella Martin. Previous to the close of the last year of study, one of the number writes: "We meet once in two weeks. At each meeting one girl has prepared one hundred questions on what we have been over since the last meeting. Another has an essay on some tribe or nation included in the lesson, while a third has written a letter for the county paper, which is read before the class (as it refers to the C. L. S. C.), before sending it to press. Next year we expect, in fact we *know*, that our class will be doubled, if not trebled. . . . There never has been a member absent since the class was formed, . . and I think I can safely say that nothing but sickness will ever keep one from being present, for we all agree that they are the most interesting days during the month. . . I would also add that we have ever remembered the memorial days."

November contains two Memorial Days. The first is Thursday, November 3d, Bryant's Day. Local circles may observe it by holding a special meeting, or a portion of a regular meeting may be devoted to an address or paper on Bryant, and the reading of the designated selections. However the day may be observed by local circles, each individual member will find it profitable to comply with the request of Dr. Vincent, and "prepare a brief memorandum for his own use, on the birth, life, times, and influence of Bryant;" also to read "Thanatopsis," "A Forest Hymn," and "The Planting of the Apple Tree." In preparing the memorandum, it may contain answers from at least the following questions: When and where was Bryant born? Who was his father, and what was his character? What instances can you give of the precocity of Bryant? How old was he when he wrote "Thanatopsis?" What profession did he enter in his early life? In what review was "Thanatopsis" published that served to introduce Bryant to several men of letters? What publications did Bryant edit during his life? What were the circumstances attending the publication of the first volume of his poems in England? What foreign journeys did Bryant make? With what languages was he familiar? What great classic works did he translate into blank verse? What were some of the public addresses delivered by Bryant? What were the circumstances attending his death? What is the character of his poems? What was his genius as an interpreter of nature? Who are the most noted poets among his contemporaries? What are some of the leading features of the prevailing schools of poetry during the life of Bryant?

In Amherst, Mass., there are two local circles. One is composed entirely of men, and the other entirely of women, with the exception of the conductor. The former is called the "Papyrus Circle," and has five members, three business men and two mechanics. They meet weekly, and each member in his turn gives out questions concerning the reading to be answered the ensuing week. One hour is devoted to this exercise, and the rest of the evening is given to general conversation concerning the lessons. The members are all busy men, but are enthusiastic in the work. Mr. N. H. Lee is President, Mr. E. A. Thompson Vice President, and Mr. J. J. Young Secretary. The other circle has a membership of sixteen. It meets every Tuesday evening at the house of Mr. C. M. Smith, who acts as conductor. The members gather around an extension table in the parlor, on which are kept Chambers's Encyclopedia, Webster's Dictionary, an atlas, and some other books. The conductor calls for questions, and a statement of any difficulties found in the reading. They next listen to the reading of papers or discussion of topics from those to whom they have been assigned at the previous meeting. The conductor, Mr. Smith, writes: "My only time for reading is the early morning from five to half-past six. We have no educated persons in our class, nor any who are familiar with ancient history. But I try to read thoroughly, and then I select topics in review, and assign them to different members of the class. In this way I am constantly reviewing, and though it takes time from my regular reading, I am repaid by the thoroughness of the method. . . The most of our young ladies are obliged to work in shops and other places. Some go quite a distance and work ten hours. All are busy and hard working people."

The Bridgewater, Conn., local circle has on its original roll the names of eighteen regular and sixteen local members. Meetings are held once in two weeks. The officers are: President, Rev. S. F. Palmer; Vice President, Miss Emily A. Treat; Secretary and Treasurer, A. W. Gillette. The committee of instruction consists of the officers, and

there is also a music committee. The programs of exercises are issued, either printed in the ordinary way, or by the use of the papyrograph, and a good deal of artistic and literary skill has been exhibited in the preparation of some of them. The C. L. S. C. motto, "Let us keep our Heavenly Father in the midst," appears at the head of each printed circular. The exercises are varied, and present some novelties. We note several from the programs before us, as follows: "Review on accompanying diagram." [The diagram is printed by the papyrograph process, and each member supplied with a copy. It is on the life of Cyrus, and contains groups of characters mentioned, classified as Median, Babylonian, Scythian, Jews, Grecian, Lydian, and Incidental. Important dates are also set forth, and below, under the heading of "Geography," are given the places mentioned in Greece, Egypt, Lydia, etc.] "Alexandrian Quiz." "Question drawer—Class Oracle." "How to study THE CHAUTAUQUAN." "Dates, and other fruit, by volunteer victims." "Anarchy—five minutes." The secretary reports of the circle that it is in a flourishing condition, nearly all the members keep "read up," that the last meeting was the best, and that there is a growing interest.

At the New England Assembly, which held its meetings for the year 1881 at Framingham, Mass., commencing August 23d, and continuing ten days, the C. L. S. C. was made prominent on the program. Among the exercises of the first day were C. L. S. C. songs. During the Assembly five C. L. S. C. Round-Table meetings were held, and the evening of August 30th was rendered conspicuous by a C. L. S. C. Camp-Fire. The first Round-Table conference was so largely attended that the Milford tent, the place of meeting, was entirely too small, and an adjournment was had to the upper part of the Auditorium. The third Round-Table conference was addressed by Prof. Arthur Gilman, of Cambridge, the editor of the "Mosaics of History," published in THE CHAUTAUQUAN. He spoke on the subject of English literature. He said it could be studied either for its history or its language. Bacon's idea that we should have a pre-notion of the subject investigated, was a good one. It is noticeable that wherever the Bible has been most studied there has been great activity along all the line of literary work. In the study of English literature he would divide the subject into periods. Prof. J. L. Corning followed with some hints on methods of studying art. He recommended the use of a common place book, properly indexed, in which to gather and classify facts in the history of art. On the day before the close of the Assembly, Dr. Vincent spoke of the religious side of the C. L. S. C. The objection has been made that the literary work of the C. L. S. C. would interfere with the study of the Bible. He believed the contrary to be true, and that the reading of history and science would increase Bible study. The C. L. S. C. is a school for the schoolless. It is for the child of seven, as well as for that large class of young people and older people who are no longer afforded the advantages of school training. Instead of competing with colleges, it inspires for college. The last day of the Assembly the C. L. S. C. Round-Table was made a special feature. Dr. Vincent presided. A book is valuable, he said, for the quickening it gives one. It is not important to remember everything. What we take to we remember. In studying art, the present year, try to remember only the important names. Mark certain passages and review them often. It is better to grapple a thought and express it in one's own language than to give the exact words of the author. The C. L. S. C. saves much weak or wicked gossip. It guides conversation into better channels. Will power is a grand help in self-culture. Fifteen minutes of concentration is better than two hours of listless study. The Circle is fulfilling a beautiful ministry in linking manual with mental labor. Members were urged to become missionaries and secure as many additions to the C. L. S. C. as possible. If a person should be six or seven years completing the course, he would belong to the class of the year in which he finished it. A specimen of a filled memorandum, containing the names of the ten characters who have most influenced history, will probably be published. Plans for the class of 1882, after graduating, were touched upon, and members were assured that there is no danger of their reaching a final stopping-point. Methods of conducting local circles were also considered. The conference closed with a grand Chautauqua salute tendered to Dr. Vincent.

The Chautauqua Literary Circle of Wheeling, W. Va., was organized a year ago, and immediately after entered upon its work as set forth by rules adopted for its government. Quite a number of those who joined remained faithful until the year closed, and completed the course of study. It is a matter of great gratification to the management to hear the testimony of these members in regard to their advancement in literary work, the cultivation of a desire for reading, and the general improvement made in habits of study, which have been developed by association with the Circle.

An important meeting of the Board of Trustees of the Chautauqua Assembly was held at the Forest City House, Cleveland, Monday, October 10th. The object of the meeting was to complete a contract with the Hotel Company, which during the past two years has built a portion of the Hotel Atheneum, at Chautauqua. The contract was perfected, and a lease for fifty years entered into. The Company has already expended about $15,000 on the hotel and furniture, and $50,000 more will be required to furnish it, according to the plans proposed. Of this $50,000, the sum of $29,000 was subscribed at the meeting in Cleveland, Hon. Lewis Miller, of Akron, O., President of the Assembly, subscribing for $10,000 of the stock; his brother, Jacob Miller, of Canton, O., for $10,000, and Mr. Glidden, of Cleveland, another well-known Chautauquan, $9,000. That the other $21,000 will be taken at an early day, is certain. The hotel and furniture will cost at least $60,000. The building will be larger, better constructed, more convenient, better ventilated and better arranged than any other summer hotel on Chautauqua Lake, and will be equal in every respect to the very best hotels in the country. The furnishing throughout, from cellar and kitchen to the sixteen magnificent rooms in the tower, will be all that could be desired. Chautauqua has long needed this improvement. Work has already commenced upon it. The foundation will be completed this fall, and the finished structure will be ready for guests in the early summer of next year.

The chapters on Geology, which members of the C. L. S. C. find in the Required Reading published in THE CHAUTAUQUAN, commencing with the October number, are from the pen of T. G. Bonney, M. A., F. G. S., Fellow, Tutor, and Lecturer in Natural Science, St. John's College, Cambridge, England. The author has written on the plan adopted for preparing most of the books in the C. L. S. C. course, viz: giving much in little space, and presenting his thoughts in a popular style. Geology comes earlier in the year's course than it was originally advertised, but we trust that all industrious students will welcome it as one of the studies for the fall months.

For some reason, to us unknown, Prof. W. T. Harris's article on "Christianity in Art," intended for this number of THE CHAUTAUQUAN, failed to reach us in time for publication. Hereafter he will have an article among the Required Reading every month.

THE C. L. S. C.

President: J. H. Vincent, D. D.
Counselors: Lyman Abbott, D. D.; Bishop H. W. Warren, D. D.; J. M. Gibson, D. D.; W. C. Wilkinson, D. D.
Office Secretary: Miss Kate F. Kimball.
General Secretary: Albert M. Martin, A. M.

ANNOUNCEMENT FOR 1881-1882.

1.—AIM.

This new organization aims to promote habits of reading and study in nature, art, science, and in secular and sacred literature, in connection with the routine of daily life (especially among those whose educational advantages have been limited), so as to secure to them the college student's general outlook upon the world and life, and to develop the habit of close, connected, persistent thinking.

2.—METHODS.

It proposes to encourage individual study in lines and by text-books which shall be indicated; by local circles for mutual help and encouragement in such studies; by summer courses of lectures and "students' sessions" at Chautauqua, and by written reports and examinations.

3.—COURSE OF STUDY.

The course of study prescribed by the C. L. S. C. shall cover a period of four years.

4.—ARRANGEMENT OF CLASSES.

Each year's Course of Study will be considered the "First Year" for new pupils, whether it be the first, second, third, or fourth of the four years' course. For example, "the class of 1885," instead of beginning October, 1881, with the same studies which were pursued in 1880-'81 by "the class of 1884," will fall in with "the class of '84," and take for their first year the second year's course of the '84 class. The first year for "the class of 1884" will thus in due time become the fourth year for "the class of 1885."

5.—STUDIES FOR 1881-82.*

The course for 1881-82 comprises readings in: 1. History. 2. Literature. 3. Science and Philosophy. 4. Art. 5. Religion.

The required books for the year are as follows:

1. HISTORY.—Man's Antiquity and Language. Dr. M. S. Terry (Chautauqua Text-Book.) Price 10 cents. Outlines of General History. Dr. J. H. Vincent. (Chautauqua Text-Book.) Price, 10 cents. Mosaics of History. Selected by Arthur Gilman, Esq., of Cambridge, Mass. (CHAUTAUQUAN.) Readings from Mackenzie's Nineteenth Century. Books First and Second. (Franklin Square edition.) Price, 15 cents.

2. LITERATURE.—Art of Speech. Part II. "Oratory and Logic" (Dr. L. T. Townsend.) Price, 50 cents. Illustrated History of Ancient Literature, Oriental and Classical. Dr. Quackenbos. Price, $3.00. English History and Literature. Chautauqua Library Vol. III. [To be ready in 1882.]

3. SCIENCE AND PHILOSOPHY.—Popular Readings concerning Mathematics, Political Economy, Geology, Chemistry, Laws of Health, and Mental and Moral Philosophy (CHAUTAUQUAN.)

4. ART.—Outline Lessons on Art. Miss De Forest. (Chautauqua Text-Book.) Price, 10 cents. A Short History of Art. Miss De Forest. Price, $2.

5. RELIGIOUS.—God in History. (CHAUTAUQUAN.) Religion in Art. (CHAUTAUQUAN.)

6. ADDITIONAL.—(*For Students of Class 1882.*) Hints for Home Reading, Dr. Lyman Abbott. The Hall in the Grove. Mrs. Alden. (About Chautauqua and the C. L. S. C.)

The following is the distribution of the subjects and books through the year:

October and November.
[Ch. stands for THE CHAUTAUQUAN.]
Outline Lessons on Art. [De Forest.]
A Short History of Art. [De Forest.]
Mosaics of History. [Ch.]
Christianity in Art. [Ch.]
Geology. [Ch.]

December
Man's Antiquity and Language. [Terry.]
Outlines of General History. [Vincent.]
Mosaics of History. [Ch.]
Geology. [Ch.]

January
Mosaics of History. [Ch.]
God in History. [Ch.]
Illustrated History of Ancient Literature, Oriental and Classical. [Quackenbos.]
Readings about Mental Science [Ch.]

February.
Mosaics of History. [Ch.]
God in History. [Ch.]
Illustrated History of Ancient Literature. [Continued.]
Religion in Art [Ch.]
Readings about Moral Science. [Ch.]

March.
Mosaics of History. [Ch.]
Readings about Political Economy. [Ch.]
Readings from Mackenzie's Nineteenth Century.
Readings about Mathematics. [Ch.]

April.
Mosaics of History. [Ch.]
Art of Speech. Part II. [Townsend.]
Political Economy. [Ch.]

May.
Mosaics of History. [Ch.]
English History and Literature [Chautauqua Library, Vol. III.]
Chemistry. [Ch.]

June.
Mosaics of History. [Ch.]
Readings about Chemistry. [Ch.]

6.—THE WHITE SEAL SUPPLEMENTARY COURSE.

Persons who desire to read more extensively in the lines of study for 1881-82 are expected to read, in addition to the "required" books for the year, the following:

Conflict of Christianity with Heathenism. By Dr. Ulhorn.
Outline Study of Man. By Dr. Hopkins.
History of Germany. By Charlotte M. Yonge.

Persons who pursue the "White Seal Course" of each year, in addition to the regular course, will receive at the time of their graduation a white seal to be attached to the regular diploma.

7.—SPECIAL COURSES.

Members of the C. L. S. C. may take, in addition to the regular course above prescribed, one or more special courses, and pass an examination upon them. A series of special courses in the several departments of study will be in due time announced, and pupils will receive credit and testimonial seals to be appended to their regular diploma, according to the merit of examinations on these supplemental courses.

8.—THE PREPARATORY COURSE.

Persons who are too young, or are not sufficiently advanced in their studies, to take the regular C. L. S. C. course, may adopt certain *preparatory lessons* for the two years.

For circulars of the special and preparatory courses, address Dr. J. H. Vincent, Plainfield, N. J.

9.—INITIATION FEE.

To defray the expenses of correspondence, monthly reports, etc., an annual fee of fifty cents is required. This amount should be forwarded to Miss K. F. Kimball, Plainfield, N. J., (by New York or Philadelphia draft or post-office order.) Do not send postage-stamps if you can possibly avoid it.

N. B.—In sending your fee, be sure to state to which class you belong, whether 1882, 1883, 1884, or 1885.

10.—APPLICATION FOR MEMBERSHIP.

Persons desiring to unite with the C. L. S. C. should forward answers to the following questions to Dr. J. H. VINCENT, PLAINFIELD, N. J. The class graduating in 1885 should begin the studies of the lessons required, October 1881. They *may* begin as late as January 1, 1882.

1. Give your name in full. 2. Your post-office address—with county and State. 3. Are you married or single? 4. What is your age? Are you between twenty and thirty, or thirty and forty, or forty and fifty, or fifty and sixty, etc.? 5. If married, how many children living under the age of sixteen years?* 6. What is your occupation? 7. With what religious denomination are you connected? 8. Do you, after mature deliberation, resolve, if able, to prosecute the four years' course of study presented by the C. L. S. C.? 9. Do you promise to give an average of three hours a week to the reading and study required by this course? 10. How much more than the time specified do you hope to give to this course of study?

11.—TIME REQUIRED.

An average of forty minutes' reading each week day will enable the student in nine months to complete the books required for the year. More time than this will probably be spent by many persons, and for their accommodation a special course of reading on the same subjects has been indicated. The habit of thinking steadily upon worthy themes during one's secular toil will lighten labor, brighten life, and develop power.

12.—MEMORANDA.

The annual "examinations" will be held at the homes of the members, and in writing. Memoranda will be forwarded to them, and by their written replies the "Committee" can judge whether or not they have read the books required.

13.—ATTENDANCE AT CHAUTAUQUA.

Persons should be present to enjoy the annual meetings at Chautauqua, but attendance there is not necessary to graduation in the C. L. S. C. Persons who have never visited Chautauqua may enjoy the advantages, diploma, and honors of the "Circle." The DAILY ASSEMBLY HERALD is published on the grounds during the Chautauqua Assembly. Send $1 for the DAILY HERALD to Theodore L. Flood, Meadville, Pa. Back numbers for 1881 can be supplied.

14.—LOCAL CIRCLES.

Individuals may prosecute the studies of the C. L. S. C. alone, but their efforts will be greatly facilitated by securing a "local circle" of two or more persons, who agree to meet as frequently as possible, read together, converse on subjects of study, arrange for occasional lectures by local talent, organize a library, a museum, a laboratory, etc. All that is necessary for the establishment of such "local circles" is to meet, report organization to Dr. Vincent, Plainfield, N. J., and then prosecute the course of study in such a way as seems most likely to secure the ends contemplated by the C. L. S. C.

15.—MEMORIAL DAYS.

Twelve days are set apart as days of especial interest to every member of the C. L. S. C., and as days of devout prayer for the furtherance of the objects of this society. On these days all members are urgently invited to read the literary and scriptural selections indicated, to collect some facts about the authors whose birthdays are thus commemorated, and to invoke the blessing of our heavenly Father upon this attempt to exalt His word, and to understand and rejoice in His works. The selections to be read on the memorial days are published by Phillips & Hunt, and by Walden & Stowe, in a small volume—Chautauqua Text-Book No. 7 "Memorial Days." Price, 10 cents.

16.—OUR CLASS MOTTOES.†

"We study the word and the works of God."
"Let us keep our heavenly Father in the midst."
"Never be discouraged."

17.—ST. PAUL'S GROVE.

The center of the Chautauqua Literary and Scientific Circle is the HALL OF PHILOSOPHY in the beautiful grove at Chautauqua, which was dedicated August 17, 1878, by Bishop R. S. Foster, in the presence of a large, devout, and enthusiastic audience. It is the purpose of the managers of Chautauqua to have St. Paul's Grove fitted up with rustic seats, statuary, fountains, etc., and make it a place of beauty and inspiration to all members of the Circle.

18.—FIRST YEAR.

Persons desiring forms of application, or information concerning the Circle, should address Dr. Vincent, Plainfield, N. J.

19.—"THE CHAUTAUQUAN."

The organ of the C. L. S. C. is THE CHAUTAUQUAN. Issued monthly, from October to July. Price, $1.50. Send subscriptions to Theodore L. Flood, Editor and Proprietor, *Meadville, Pa.*

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*The additional books for the "White Seal Course" for 1881-82 are: "Conflict of Christianity with Heathenism," by Dr. Ulhorn; "Outline Study of Man," by Dr. Mark Hopkins; "History of Germany," by Charlotte Yonge.

*We ask this question to ascertain the possible future intellectual and moral influence of this 'Circle' on your homes.

† These mottoes are issued on large cards by Prang & Co., of Boston, Mass. Each motto sells at $1.

EDITOR'S OUTLOOK.

THE numerous articles which have recently appeared, both in the secular and religious press, concerning the New Version, are indicative of the interest and solicitude which its publication has awakened among all classes. As was to have been expected, a great variety of opinion has been expressed by the various writers concerning it, some lauding it to the skies, while others consider it a source of mischief and confusion.

Perhaps no class of men are so well adapted to judge correctly concerning its merits as the Christian ministry. As a body, they represent a large share of the learning of the times, and their devotion to the Word of God has never been called in question. In their desire to obtain a thorough understanding of its teachings they have always hailed with delight every substantial contribution to biblical literature, and have gladly availed themselves of all the light and knowledge which the learning of their times has placed within their reach concerning the Holy Scriptures, and at the same time have been jealous guardians of the sacred trust committed to their keeping.

The constant aim of every Gospel minister should be to utilize everything that will enable him to gain a clearer view of the Word of God in its purity. For this purpose the New Version may be used with great advantage. To say the least it is a valuable help in Bible study in attaining to a right understanding of the received text, and no minister should allow any preconceived prejudice or adverse criticism to hinder him from utilizing the advantages which it affords in this respect. In his study, the minister should make the New Version the constant companion of the old, whatever may be his own personal opinion concerning it. The New Translation embodies the results of the ripest scholarship of the times, and as such is worthy of the most candid consideration. It should be collated with the Old Translation, and also with the Greek text, by every minister who is possessed of sufficient scholarship to enable him to do this. The New Version will thus become a valuable adjunct to the study of the Word, and the different modes of expressing even the same thoughts will often set forth a passage of Scripture in a new light, and enable the student to consider it from a new standpoint, and thus increase his breadth of view.

No minister is at liberty, on his own authority, to substitute the New Version for the King James translation in any public service, even though he may hold it in the highest esteem. The introduction of the New Version into the services of the Church is a matter that pertains to each denomination, as a religious body, to determine for itself; and, until the New Version has received the denominational sanction from the acknowledged official sources, no individual member should presume to substitute it in place of the authorized version in any church service whatever.

THE whole country has been draped in mourning, and still bears visible traces of its woe. The Chief Magistrate of this nation has fallen, slain by the hand of a murderous assassin. Fifty millions of people mourn his untimely death, and all the civilized world manifests its sincerest sympathy with them in their sorrow. The death of James A. Garfield is a national loss. Though his time as President was short, he had won the respect of all parties, and his administration was full of promise for the welfare of the country. He had marked out for himself a broad and liberal policy, which he doubtless would have faithfully carried out had his life been spared through the Presidential term. Before his election he had already attained a national reputation. In Congress, before his nomination to the Presidency, he had won the proud distinction of being the leader of his party. Throughout his long course of public life he had proven himself worthy of the trust reposed in him by his constituents, and their high appreciation of him was shown by the fact that at one and the same time he was Representative in Congress, Senator-elect and President-elect, the only instance of the kind that has ever occurred in the history of the country.

President Garfield won his way to such high honors, not by shrewd political stratagems, but by faithfully fitting himself for the duties devolving upon him in the various stations which he was called to occupy, so that when he came into the Presidential chair he was not looked upon by the nation at large as an ambitious politician who had attained the acme of his desires, but as a man whom the people could trust, and he was honored accordingly.

His career is an abiding inspiration to the young men of the country. Born amidst the humblest surroundings, reared in poverty, with no advantages, without genius, save a capacity for hard work, he raised himself, without the aid of powerful friends or of great wealth, by the sheer force of his indomitable will, and by patient, persevering toil, to the most exalted position an American citizen can attain. His pluck, industry, integrity and perseverance are certainly admirable qualities, and his example in these respects is certainly worthy of emulation by all those desiring to achieve success.

He attained to a symmetrical development which justly entitles him to the appellation of a "full-orbed" man. As an educator, soldier, lawyer, legislator, party leader and ruler of a great nation, he displayed such fitness for the spheres he occupied as commended him to all, and by his sincerity, honesty and integrity he won the respect even of his opponents. His moral integrity and Christian character stand out in bold relief on the political background. He was, from the beginning till the end of his career, a man of principle, and not of policy. When yet a youth he espoused the religion of the Lord Jesus Christ, and whether in the school, in the camp, at the bar, in Congressional halls or in the Presidential chair he was a faithful, consistent Christian, and met his fate with that peaceful composure that Christianity alone can inspire.

It is a common saying that "Republics are ungrateful," but this declaration has proven false in our day, and in this land. The family of the fallen Chief Magistrate is being amply provided for in a generous manner by the wealthy citizens of the republic, by voluntary donations to the Garfield Fund, which will doubtless aggregate nearly a half a million of dollars in the end, and the turf was scarcely heaped over his grave ere a movement was put on foot to secure a fitting monument to mark his resting place, and doubtless before this article will appear in print, sufficient funds will be secured for that purpose. But the grandest and most enduring monument to his fame is his pure and noble character, which he leaves as a legacy to his family and to the nation for which he died.

A NOTEWORTHY event of the season is the departure of Messrs. Moody and Sankey for England, to engage in evangelistic work. The remarkable success which attended their labors when abroad six years ago is fresh in the remembrance of the Christian public. Their second tour is undertaken at the earnest solicitation of many prominent ministers and laymen, both of the Established and Independent Churches, of England, Scotland and Ireland, who are desirous of securing the assistance of these eminent Christian laborers in promoting the cause of religion in their midst. Evangelistic laborers seem to be the peculiar product of American churches. Of late a large number of evangelists, both men and women, have been raised up among us, and

their labors have been productive of great good. Having but few of her own, England desires to utilize some of the most eminent of our evangelists in promoting the religious welfare of her people.

The labors of our evangelists in behalf of the English people is but the payment of a just religious debt. In the early years of our history, English missionaries did the pioneer work for the churches of to-day. Roger Williams, Whitefield and Asbury heard the Macedonian cry of this new world, and came from over the seas to our aid. The churches of America ought to rejoice that they are able to repay this debt with interest, by sending to England, when she cries for help, earnest evangelists, whose success is a common heritage. This fact speaks volumes for the spiritual condition of the churches in our land.

That the masses in England stand in great need of evangelistic effort there is no question. Though nominally Christian, they are sadly lacking in spirituality and piety. The Established Church, in its ministry and membership, is either on the one hand largely rationalistic, or on the other ritualistic. One wing is drifting toward infidelity, the other toward Rome. The Independents are overshadowed by the magnitude and influence of the Established Church, and take their tone *from* it, rather than give tone *to* it, as in the days of Wesley, Whitefield, and their coadjutors. The Evangelicals are becoming aroused to the gravity of the religious situation, and from them has come the cry for help that has met with such prompt response.

In addition to the religious work done by our evangelists, American laborers have rendered valuable assistance in reformatory movements in England. John B. Gough has traversed the British isles twice in the interests of temperance, and Francis Murphy, the temperance apostle of the times, is now engaged in active work for the same cause in England. America has also contributed to the intellectual advancement of the mother country. Emerson, Beecher, Talmage, and Joseph Cook, with others of our leading thinkers and speakers, have rendered royal service in enlightening English audiences in reference to American institutions. All of these facts are strikingly indicative of the spiritual, moral and intellectual activity that distinguish the American people to-day.

DR. J. G. HOLLAND, the well-known author and editor, died suddenly at his residence, No. 46 Park Place, New York, October 12th, of heart disease, with which he had been afflicted for the past six years.

Dr. Holland has been long and favorably known in the literary world. He was born in Belchertown, Mass., July 24, 1819. After acquiring a good education he applied himself to the study of medicine, and graduated from the Berkshire Medical College at Pittsfield, in his native State. Not finding his chosen profession congenial to his tastes, after three years he abandoned the practice of medicine and devoted himself to literary pursuits. He began his new career as editor of a literary journal in Springfield, Mass., but after a few months went to Vicksburg, Miss., where he obtained the position of Superintendent of Schools, which position he held for one year. After his return North, he became, in May, 1849, associate editor of the Springfield *Republican*. In a short time he obtained a proprietary interest in that journal, and remained on its editorial staff till 1866. In 1870 he became editor of *Scribner's Monthly*, and continued in that position till the time of his demise. The day before his death was spent by him in the office of the *Monthly* in preparing for publication his "Topics of the Time," for December number. His adaptation to and fitness for the position which he occupied was shown by the fact that within ten years after he assumed the editorial management of *Scribner*, it became one of the best and most widely circulated magazines in the world.

Besides attending to his editorial duties he was also a voluminous writer of books, and his works attained a good degree of popularity. In the beginning of his literary career he adopted the *non de plume* of Timothy Titcomb. Under this cognomen he published "Letters to the Young," "Gold Foil," "Lessons in Life," and "Letters to the Joneses." These volumes were all of a moral and didactic character. In addition to these, he also wrote a "History of Western Massachusetts," in two volumes, and a "Life of Abraham Lincoln." He was also the author of a number of novels, the most notable of which was "Arthur Bonnicastle," with which most of our readers are doubtless familiar. He was also a poet of no mean order, and his "Bitter Sweet" and "Kathrina" occupy a prominent place among American poems. Early in his literary career he entered the lecture field, and frequently appeared upon the platform. He was known in this sphere as an entertaining speaker, and delivered many lectures on social and literary topics.

It is evident from these facts that he was a man of untiring industry, and doubtless his intense and prolonged labors as editor, lecturer and author superinduced the disease of which he died.

His essays, poems and novels are all alike notable for purity of style and sentiment. As an editor he displayed admirable tact and judgment, and as a man he was without reproach.

WHEN the future historian writes the history of our times he will have a beautiful story of benevolence to tell, laid at Clifton Springs, N. Y. The Sanitarium, or House of Healing, that was opened at this place thirty-two years ago by Dr. Henry Foster, has grown in public favor with an increasing patronage, until it is, financially, the strongest institution of its class in the country. Dr. Foster made a covenant with God, thirty-two years ago, that, if He would give him the daily consciousness of His favor, he would devote the entire prosperity of his profession to the cause of Christ, and that if God desired him to establish a "House of Healing" he would make the establishment and its proceeds an absolute gift to God for his afflicted children. It is claimed by Dr. Foster that the covenant was made, and that for thirty-two years past he has been working under it. More than sixty thousand patients have enjoyed the benefits of the institution. Christian ministers and other workers in the Lord's vineyard have shared gratuitous treatment for twenty years, which has averaged $15,000 each year. The Rev. J. O. Peck, D. D., explains in the New York *Advocate* the concluding act of Dr. Foster under this agreement:

> Dr. Foster, having now reached sixty years of age, and having built up a great Sanitarium free of debt, felt that the time had fully come to fulfil his covenant, and to make his offering effectual by legal forms. Accordingly, he has executed a deed of trust, conveying the institution and all its appurtenances in perpetuity to a Board of Trustees, representing the leading Evangelical denominations.

THE FIRST BOARD OF TRUSTEES

is as follows:

1. Bishop Matthew Simpson, D. D., LL, D., of the Methodist Episcopal Church.
2. Bishop A. C. Coxe, D. D., of the Protestant Episcopal Church.
3. The Rev. N. G. Clark, D. D., Secretary of the American Board of Commissioners for Foreign Missions.
4. The Rev. J. M. Reid, D. D., senior Missionary Secretary of the Methodist Episcopal Church.
5. The Rev. J. N. Murdock, D. D., Secretary of the American Baptist Missionary Union.
6. The Rev. F. F. Ellenwood, D. D., Secretary of Foreign Missions of the Presbyterian Church.
7. The Rev. J. M. Ferris, D. D., Foreign Missionary Secretary of the Reformed Church.
8. The Rev. M. B. Anderson, D. D., President of the Rochester (N. Y.) University (Baptist.)
9. The Rev. James B. Shaw, D. D., of Rochester, N. Y., (Presbyterian.)
10. Judge James C. Smith, of Canandaigua, N. Y., (Episcopalian.)

11. Andrew Pierce, Esq., of Clifton Springs, N. Y., (his successors to be from the Orthodox Friends.)
12. The Rev. George Loomis, D. D., of Clifton Springs, President of the Foster School for Young Ladies (Methodist.)
13. William Foster, Esq., of Clifton Springs (Methodist.)

By wise forethought Dr. Foster has made the first seven trustees perpetual *ex-officio*, so that this majority of the Board is permanently constituted of such men as will secure the trust from being perverted or diverted from the original purpose of the donor.

The successor of Bishop Simpson must always be a Bishop of the Methodist Episcopal Church.

The successor of Bishop Coxe must always be the Protestant Episcopal Bishop of the Diocese in whose jurisdiction the Sanitarium is located. Each successor of the several Missionary Societies above named must always be the Senior Secretary of their several Missionary Societies. Thus these seven trustees are officially perpetual.

The six other trustees must always be elected by the Board of Trustees from the respective denominations which their predecessors represented, and are to be men corresponding in character and position, so far as possible, to the original trustees. The term of office of each trustee is for life, or during good behavior, unless he shall resign or be deposed for cause.

THE PROPERTY DONATED

consists of the Clifton Springs Sanitarium, a five-story brick building, 240 feet in length and 300 feet in depth (including adjuncts), containing some 160 rooms for guests, in addition to offices, bath-houses, air cure, gymnasium, chapel, elevator, and all other appointments of a Sanitarium, unsurpassed, perhaps, on either continent. This massive building is located on forty-four acres of land, diversified by parks, groves, lakelets, brook, springs, the elegant Peirce Pavilion, arbors, and music-stand, thus forming a charming and picturesque home for invalids while seeking the restoration of health. In addition to the above donations of the Sanitarium and extensive grounds, with complete equipment, wholly free from incumbrance, Dr. Foster has given his beautiful cottage home—a scene of arboresque and floral loveliness—as the perpetual residence of the chief physician, after the decease of the donor and his wife.

THE ENDOWMENT

next challenges attention. Besides the above munificent gifts, Dr. Foster has partially endowed the institution. He has deeded to the trustees the "Foster Block," a fine brick block, some 220 feet in length and four stories in height, containing nine rented stores on the ground floor, and large hotel above, in the business part of the town—to be known as the "Grace Foster Endowment Fund." Also $160,000 of fire insurance now covering the different properties, is made over to the new corporation. And to complete his covenant of giving *all* back to God, he has assigned his entire life insurance of $52,000, to the trustees as an endowment fund toward the payment of the salary of the chief physician.

THE BENEFICIARIES

of the Sanitarium are selected with reference to the largest probable helpfulness of the institution to the cause of Christ. Until the endowment spoken of above is completed, paying patients will be received (as now) to meet current expenses, repairs, and provide a Sinking Fund against loss by fire, and beyond the above requirements the balance of the capacity of the Sanitarium will be devoted to the beneficiaries at reduced rates, or gratuitously, according to their worldly circumstances. But when the endowment shall be sufficient to cover all the expenses, then the entire capacity of the Sanitarium shall be devoted to the gratuitous treatment of the classes herein designated:

1. Missionaries and their families who are dependent upon their salaries for support.
2. Ministers of the gospel and their families who are dependent upon their salaries for support.
3. Teachers who are unable to pay for their treatment, and upon the same conditions members of the Church.

Preference is to be accorded in the order of the three classes named. The Sanitarium is not to be a home for incurables, nor an asylum where selfish persons of wealth may get rid of the care of infirm or troublesome friends, nor a boarding-house for the hopelessly sick or Church's poor, but strictly a Sanitarium for the restoration of the afore-named classes to health and to their work in the vineyard of the Master, who, through his servant, has provided for them a house of healing. The length of stay of the beneficiaries in the institution, as well as all other regulations concerning the patients, will be fixed by the medical faculty according to the needs and merits of each case.

EDITOR'S NOTE-BOOK.

Queen Victoria's order for the Court to go into mourning when President Garfield died, was a startling innovation upon established etiquette. It struck the Court officials with dismay, not that they were not personally desirous of paying respect to the President, but the departure from all precedent was so sudden and so revolutionary. Never before has there been a departure from the rule. Americans will remember the Queen of England with gratitude for the generous expressions of sympathy she has shown to them and the family of our late President when passing through the great sorrow.

The Cherokee *Advocate* says that there are 154 Baptist Churches in the Indian Nation, in a population of about 60,000. This is one church to less than four hundred people.

A member of the class of '82, seeing the Chautauqua Games, said: "I guess we'll have enough to do this year without playing any games." It was as if one should say: "I walked three miles because I was too much hurried to get into the carriage." The great complaint is: "I have to look back constantly because I do not remember what I have read." These games of The Sciences, of Roman and of United States History can be played when one is too tired to read, or when company should be entertained, and they are condensed reviews, which, once learned, *can never* be forgotten. The children who need amusement during the winter evenings could have no better preparation for the C. L. S. C. course than would be gained by playing these games. For either, send fifty cents to "Student," 198 Clinton street, Buffalo, N. Y.

A member of the C. L. S. C. desires correspondence with another member who is interested in microscopy. His address is William J. Morrison, Moorestown, N. J.

Ever since Dean Stanley died, speculation has been rife as to his successor. The Deanery of Westminster is regarded as one of the prizes of the church. Compared to the great bishopries, its money value is small. The pay is only $10,000 a year, while the chief episcopal salaries range from $25,000 to $75,000 a year, and only two or three of the minor ones are less than $20,000. It has been said to be one charm of Westminster that its Dean is subject to no episcopal authority. Dr. Bradley, formerly head master of the Marlborough school, and recently master of University College, at Oxford, England, has been appointed to, and he has accepted, the Deanship of Westminster.

The report circulated in the press that the Congressional Committee had selected Catholic priests to officiate at the Yorktown celebration was without foundation. Bishop W. L. Harris, LL. D., of the Methodist Episcopal Church, and the Rev. John Hall, D. D., of the Presbyterian Church, were chosen to conduct the religious services.

The Rev. W. H. Withrow, A. M., of Toronto, editor of the *Canadian Magazine*, is presented to our readers this month as a lecturer on the Catacombs of Rome. The following lines from his pen in a late number of his magazine will find an echo in many hearts at this time:

As the great bridge which spans Niagara's flood
  Was deftly woven, subtle strand by strand,
  Into a strong and stable iron band,
Which heaviest stress and strain has long withstood;
So the bright golden strands of friendship strong,
  Knitting the Mother and the Daughter land
  In bonds of love—as grasp of kindly hand
May bind together hearts estranged long—
Is deftly woven now, in that firm gage
  Of mutual plight and troth, which, let us pray,
May still endure unshamed from age to age—
  The pledge of peace and concord true alway:
Perish the hand and palsied be the arm
That would one fibre of that fabric harm!

One of the latest newspaper enterprises is publishing a daily paper on the summit of Mount Washington. Dr. Blakie reports that it is called *Among the Clouds*. Its news is limited to a record of the weather at the signal station the previous day, last night's arrivals, and notes from the adjacent tourists' station. It is the only paper in the country published on the top of a mountain.

Get up clubs for THE CHAUTAUQUAN. When five or more subscriptions are sent at one time we furnish it for $1.35 to each subscriber. Judge Tourgee's new story, "A Shorn Sampson," will of itself be worth the price of the magazine. Back numbers can be supplied.

Judge Tourgee will lecture during the coming season on the following subjects: "The Coming Crusade," "Give us a Rest" and "How to Boss the Bosses." The Redpath Lyceum Bureau, of Boston, which has charge of his engagements, reports his time as already rapidly filling up, and committees who wish to secure him will have to act promptly. No Chautauquan needs to be told that he is one of the strongest and most original of our platform orators. He never speaks unless he has something to say, and he says it in a way peculiarly his own. One who hears him begin will be sure to hear him close, and one who has heard him once will never miss hearing him again, if occasion offers.

Judge Tourgee's new story, entitled "A Shorn Sampson," will commence in the December number of THE CHAUTAUQUAN. It is being written expressly for this magazine. It will be continued in every number to the end of the volume. The Judge's lecture in this number on "The Christian Citizen," is as readable as his book, "A Fool's Errand."

Twelve Presbyterian Churches in New York report a membership of a thousand or over. They are as follows: Dr. Talmage's, 2,471; Dr. Cuyler's, 1,761; Dr. Kittredge's, 1,755; Dr. Hall's, 1,730; Dr. Parkhurst's, 1,560; Dr. Crosby's, 1,384; Dr. Dunn's, 1,340; Dr. Shaw's, 1,298; Dr. Booth's, 1,193; Dr. Bevan's, 1,100; Dr. Hemphill's, 1,044; Dr. Hastings's, 1,000. Besides, there are 56 churches, each having over 500 members, some of them lacking only a few score of 1,000; while there are a large number which have between four and five hundred members.

If there are ladies or gentlemen in connection with the C. L. S. C. who are advanced in their studies, and who have the leisure to correspond with and assist other members desiring the benefits of such personal direction through correspondence, Dr. J. H. Vincent, Plainfield, N. J., would be glad to receive their names and written consent to such arrangements, that he may put them in communication with parties calling for such assistance.

A paper was read recently before the New York Medical Society by Dr. Clinton Wagner on "Habitual Mouth Breathing." He thinks that many diseases of the throat and ear may be traced to this cause. The nostrils are lined with blood vessels that warm the air inhaled, and this is nature's order. Dr. Wagner thinks that mouth breathing is the cause of all the snoring. If this statement is true, we suggest for the comfort of visitors in Noah's Ark, in tents and cottages at Chautauqua, and at other encampments, that the doctor's lecture be widely circulated, and enforced as a law of life.

The Rev. S. M. Barnitz, D. D., who is well known to Chautauquans, has just resigned the pastorate of the English Lutheran Church in Wheeling, W. Va., a position he has held for nearly twenty years. He has been appointed Western Secretary of Home Missions by the General Synod of the Evangelical Lutheran Church. It is an excellent appointment. Dr. Barnitz is a man of affairs, a strong preacher, and a hard worker.

In every town or city where there is a local circle, some member should be selected—if this is not done, one should volunteer—to furnish reports of the growth and work of the circle in the daily or weekly papers of the town, city or county. These reports will be welcome news to editors, and they will inspire readers of the papers to take up the C. L. S. C. course of study. Members who have an itching of soul to write for the press, will find the C. L. S. C. a fruitful subject for the pen. Let the public know through the local press what the C. L. S. C. is, and what it proposes to do.

The summary of the Presbyterian Board of Home Missions for the past year shows that 1,217 men have been in commissions in 39 States and Territories. Kansas has 124 missionaries, and Iowa 103. Of the whole number, 940 are in the Western States and Territories. The missionaries report 4,979 additions on confession, and 4,715 on certificate, and a total membership of 65,666, with 99,018 in the congregations. There are 1,147 church edifices, and $115,865 of church debts was paid the past year. The total receipts of the Board were $345,911, the largest since the reunion.

The editors of the Methodist *Advocates*, published in different parts of the country have been absent in England for a time, attending the Ecumenical Council. They have written up the steamers, the ocean and England pretty thoroughly for their readers. The *Methodist* (Independent), of New York, suggests that the associate editors have done so well in the chairs of their chiefs that it will be an easy thing to find successors for the chiefs when the time for a change comes.

At a public meeting held in Washington, it was decided to purchase the railroad building in which President Garfield was shot, and convert it into a Memorial Hospital. The building stands on land belonging to the United States Government, which would undoubtedly be appropriated for the purpose. The theatre in which President Lincoln was murdered was purchased by the Government and converted into a Medical Museum and Library. A large committee has been appointed to carry out the object, of which General Sherman is Chairman, Hon. James Gilfillan, Treasurer, and Secretaries Blaine and Windom, and others, are members.

It seems that even General Grant has a short memory at times. When the New England Sunday-school Assembly was in session at Framingham, a telegram was sent to the General inquiring what day he would be there. He replied that he was under no engagement to be present. Dr. Vincent took a train, and laid before the General his own letter in which he pledged himself to be present and participate in the exercises! He acknowledged that the Doctor "had him."

EDITOR'S TABLE.

[We solicit questions from our readers to be answered in this department.]

Q. What is the best work on woman suffrage, and where may it be obtained?

A. "The History of Woman Suffrage" is to be a very complete work, and we think it is the best. The first volume, which numbers eight hundred and seventy-eight pages, has been issued from the press of Fowler & Wells, 753 Broadway, New York.

Q. How soon after the juice is pressed from the fruit does fermentation take place?

A. Fermentation certainly does not take place immediately after the juice of the fruit is exposed to the atmosphere. The best authorities say it sometimes begins in a few hours, and sometimes not for days.

Q. A correspondent says: "In the church of which I am a member, fermented wine is used at the Lord's Supper. I earnestly protest against its use. Am I right?"

A. Yes. There is much harm done by using fermented wine in the churches. Some good people, who have never been intemperate, are peculiarly susceptible to the influence of strong drink. Their only safety lies in total abstinence. A hereditary weakness of appetite gives them much trouble. Others in the church have been reclaimed from a life of intemperance, and the taste or smell of fermented wine, even in the church, may wake up the lion that will slay them. In conducting religious services we should avoid leading the weak or strong into temptation. Unfermented wine may be obtained by drying the grapes—raisins are simply dried grapes—and making the wine when it is needed, or the grapes may be preserved from vintage to vintage by keeping them dry, and the juice can be pressed as needed; or, still another plan may be adopted, viz: press the juice from the grapes, place it in bottles and keep it hermetically sealed. It will be found in an unfermented state, ready for use at any time.

Q. I have read that ministers of the Established Church of England did not fraternize with the Methodists during the recent session of the Ecumenical Council in London, by inviting their ministers to preach in the pulpits of the Churches of England. Is this true, and if so, why?

A. Ministers of the Church of England never invite ministers of any other denomination to occupy their pulpits. Our young questioner deserves a plain answer. They hold that preachers of other denominations are not ordained men, because they have not received ordination, as they think they have, in a direct line from the apostles. We do not speak by compulsion nor by inspiration, but we think every person, man or woman, is a preacher of the Gospel when they are born again and called by God's spirit to declare the Gospel to men.

Q. What is the meaning of Annunciation Day? Reference is made to it in Luke's Gospel, first chapter, but I don't find an explanation there.

A. In its broadest sense, the word annunciation was used in speaking of important information sent by angels from Heaven, but in its relation to Luke, first chapter, it designated the miraculous conception of our Saviour. An author, whose name we can not recall, says of this word and its accompanying event: "So highly was the fact regarded in the early ages that a festival, or day specially set apart for the consideration and honor of the annunciation, was appointed for it as early as the seventh century; but sermons of St. Athanasis are spoken of, which, being of an earlier date, prove its observance long before. The twenty-fifth of March, or Lady Day, is that observed in reference to the event.

Q. What is the telephonoscope? Is there such an instrument?

A. This is one of Prof. Edison's inventions. It is to the ear what the telescope is to the eye. Dr. Garbit says: "As the eyes receive and transmit the vibrations or waves of light, so the ear receives and transmits the vibrations of the air, set in motion by the human voice at a distance." On this principle Mr. Edison has constructed his little instrument for the use of *deaf, or partially deaf persons*, so that, without any perceptible apparatus, such as an ear trumpet, the softest whisper may be heard.

Q. The trial of the Rev. Dr. Thomas for preaching heresy has made a genuine sensation out here, in and about Chicago. What is to be gained by the Church by such ecclesiastical conflicts, if even he is silenced as a preacher by the Methodists expelling him from the ministry?

A. People who hold the form of sound doctrine, especially a strong church, guard with jealousy the principal doctrines of their creed. It is claimed that Dr. Thomas has not preached the doctrine of the atonement, and one or two other doctrines, as they are held by his Church. Any man may violate his personal obligation, but he must abide the result. If he does this as a preacher of the Scriptures, after he has taken vows to preach them as his Church interprets them, then he is accountable to his Church, and she has a right to sit in judgment on his case. While she may not decide that he is a wicked man, and cast him out of the kingdom of God, yet it is the privilege of every Church to say who shall and who shall not minister at her altars. Mr. Wesley would have tried such a man in class-meeting, as the Savior tried Peter, with the question, "Lovest thou me?" "Reformation" John Adams, as he was known among his friends in New England, used to say: "Never have a church trial in a dry time. Do that when you have a revival in your church. Do it in a wet time, so that when you pull up the tares you may not pull up the wheat also."

Q. Is Mormonism increasing or decreasing in Utah, and on the Pacific coast?

A. We think the verdict of the newspaper world is this: *It is on the increase.* As a system, the government is not destroying it. It is not being limited in its operations, nor is it being suppressed in Utah, where it is the strongest. The Mormons are recruiting their ranks by immigration from foreign countries. Five hundred and fifty recruits recently embarked at Liverpool for Salt Lake City, and it is reported that over two thousand converts left that port for Utah during the past summer. The Mormons have missionaries plying their trade in certain districts of Europe among the ignorant and neglected classes, who are easily persuaded to accept the offers made. The Mormons keep a bank account in London, and they draw on their funds to pay the expenses of the people they induce to go with them, and then the president and his apostles receive and distribute these newly made *saints* when they arrive in Salt Lake City. We must have some kind of legislation to prevent this kind of immigration, if we would strike Mormonism a death blow. The Mormons are not dying off, or being converted to the truth, on the Pacific coast, as fast, seemingly, as they are coming from foreign countries.

Q. Is it true that the Queen of Madagascar is a temperance woman, and that she has recently taken strong ground in favor of prohibition?

A. Reliable reports inform us that the Queen of Madagascar, in a recent proclamation forbidding her subjects either to sell or drink rum, says: "I can not take a revenue from anything that will debase and degrade my people." This would indicate that she uses her authority and influence to support the cause of temperance, and to suppress the traffic in spiritous liquors. Since this is done under a pagan government, we may blush for very shame when we think how much such action is needed in our own Christian country, and how slowly we secure the authority of the law on the side of the temperance reform.

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We have received more postage stamps than we will be able to use for the next two years. We there ore must decline to receive any more on subscriptions to THE CHAUTAUQUAN. Send drafts on New York, Philadelphia, Baltimore or Pittsburgh, or Post-office Money Order.

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HON. ALBION W. TOURGEE, LL. D.,

Author of "A Fool's Errand," "Bricks Without Straw," etc., is now writing a story expressly for THE CHAUTAUQUAN. The title is

"A SHORN SAMSON."

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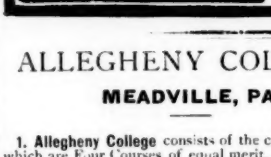

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